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TWENTY-FIRST BIENNIAL REPORT

OF THE

BOARD OF FISH AND GAME COMMISSIONERS

OF THE

STATE OF CALIFORNIA

FOR THE YEARS 1909-1910

COMMISSIONERS:

1909.	
GEORGE STONE	SAN FRANCISCO
F. W. VAN SICKLEN	ALAMEDA
M. J. CONNELL	LOS ANGELES
1910.	
F. W. VAN SICKLEN	ALAMEDA
M. J. CONNELL	LOS ANGELES
W. G. HENSHAW	OAKLAND

SACRAMENTO:
W. W. SHANNON, : : : : SUPERINTENDENT STATE PRINTING.
1910

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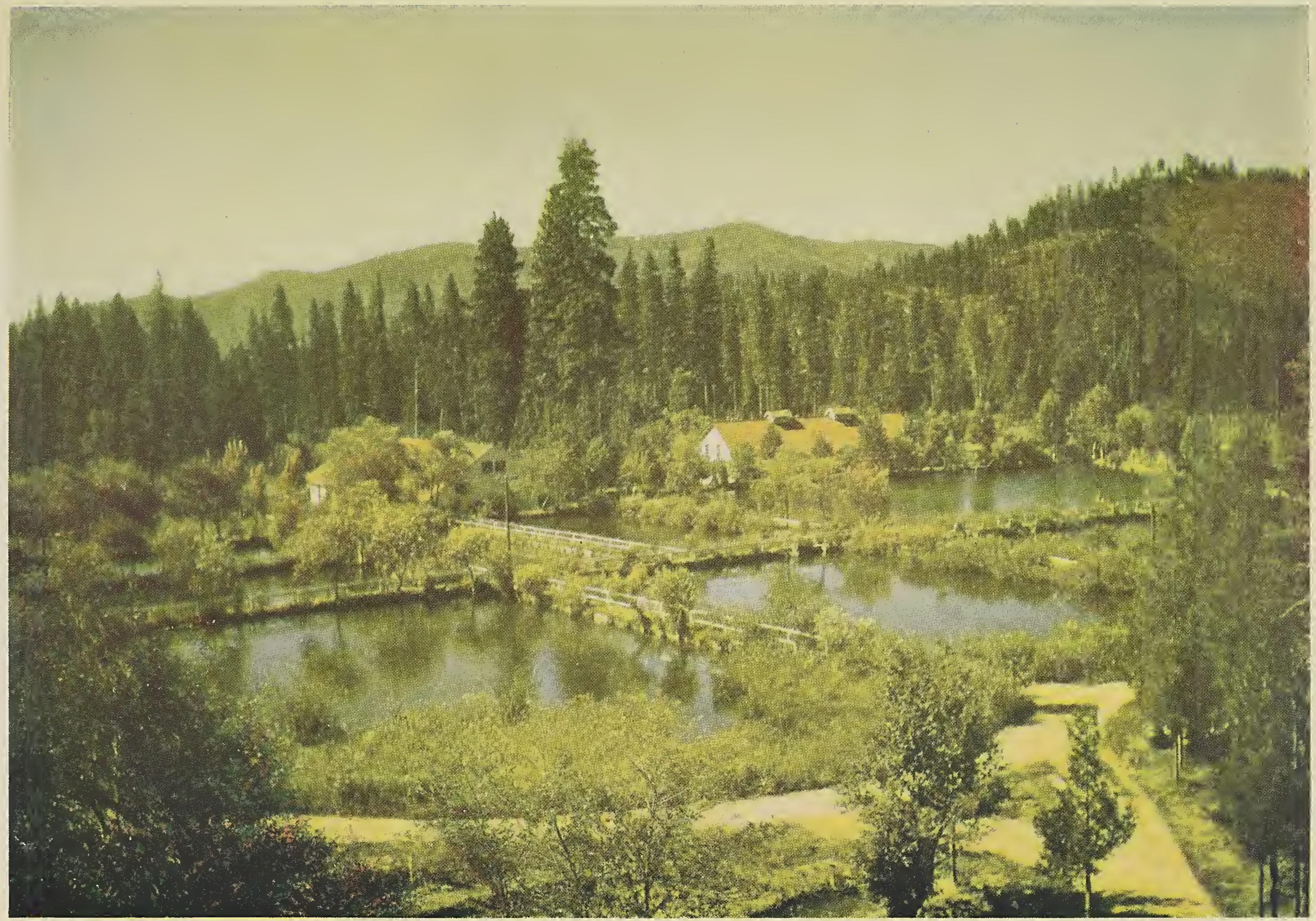


PARTIAL VIEW TROUT REARING PONDS, SISSON HATCHERY

TRICHROMATIC PHOTOGRAPH DIRECT FROM NATURE, JUNE, 1910

TWENTY-FIRST BIENNIAL REPORT

OF THE

BOARD OF FISH AND GAME COMMISSIONERS.

San Francisco, Cal., November 11, 1910.

Hon. J. N. Gillett,
Governor, State of California, Sacramento, Cal.

Sir: In accordance with law, the Board of Fish and Game Commissioners have the honor to submit for your consideration its Twenty-first Biennial Report, showing the receipts and expenditures from July 1, 1908, to June 30, 1910; also a record of its work from the date of its last report, September 1, 1908, to September 1, 1910.

Owing to the exhaustion of the appropriation given the Commission for printing at the thirty-seventh session of the legislature, the Board was unable to print for general distribution its twentieth biennial report. You will find in the Appendix of this report a reprint of that report as submitted to you and the members of the thirty-eighth session, that it may in this way take its place in the history of the Commission.

During the thirty-eighth legislative session we succeeded in having the statutes so amended that after July 1, 1909, ample authorization could be found permitting us to pay for all necessary printing and stationery supplies out of our own funds without taxing the general fund of the State therefor, and we are, therefore, able this year to present a more elaborate and detailed report.

We also submit for your consideration such recommendations as in our judgment the legislature should, for the betterment of existing conditions, provide enactments.

The personnel of the Commission since its biennial report of 1906 has undergone several changes. On May 14, 1907, Mr. George Stone of San Francisco, who had been appointed by you to fill the vacancy caused by the resignation of Mr. W. W. Van Arsdale, presented his credentials and took office. On June 25, 1907, Mr. F. W. Van Sicklen of Alameda succeeded to the vacancy caused by the resignation of Mr. W. E. Gerber, who, with Commissioner Van Arsdale, had served nearly six years. At the first meeting of the Board held May, 1907, George Stone was elected president, and served until May 12, 1910. On July 15, 1908, Mr. M. J. Connell of Los Angeles, who had been appointed by you, presented his credentials to the Board, succeeding Mr. John Bermingham, Jr., of Pinole (resigned), who had served from March 23, 1905. On May 12, 1910, Mr. W. G. Henshaw of Oakland, who had been appointed by you to fill the vacancy caused by the resignation of George Stone, took his seat as a member of the Board. On August 15, 1910, Mr. Chas. A. Vogelsang, who had been the Chief Deputy of the Board since October 15, 1901, and who on May 12, 1910, tendered his resignation as such officer, was succeeded on August 15, 1910, by John P. Babcock, who was the Chief Deputy of the Board from 1892 to 1901.

In order to better meet the demands made by the steadily increasing volume of business, it was decided to establish a southern district, with headquarters at Los Angeles, and that office to be under the personal supervision of the resident commissioner, Mr. M. J. Connell, to whom all deputies in southern California should report. This office was established July 1, 1908, and embraces the counties of San Diego, Imperial, Riverside, Orange, San Bernardino, Los Angeles, Inyo, Ventura, Santa Barbara, and San Luis Obispo.

The results proving so satisfactory, another district was established June 1, 1909, in the San Joaquin Valley, with headquarters at Fresno, and Deputy A. D. Ferguson placed in charge. The San Joaquin district embraces the counties of Kern, Kings, Tulare, Fresno, Mariposa, Merced, Madera, Stanislaus, and Tuolumne.

This segregation of the work has greatly facilitated the dispatch of business and proved of great advantage to the respective sections, and strongly suggests the advisability of establishing a third district in the northern part of the State.

The results that have followed amendments to the statutes during the thirty-seventh and thirty-eighth legislative sessions, and which became laws by your approval, have been in the main satisfactory.

The commercial fisherman's license law, as amended at thirty-eighth session produced a total revenue for the first year of its operation of $22,350.00, as against a maximum collection under the old law of $6,647.50, or an annual gain of more than $15,000.00. Under the provisions of this law a fee is exacted of every person who fishes for profit, whether using boat, nets, crawfish traps, or lines of any kind. This feature has enabled us to collect from many who were practically exempt under the old law, which applied only to those who used boats and nets. The total amount arising from this source is added to the appropriation of $20,000.00, made for the support and maintenance of hatcheries. It has enabled us to carry out necessary improvements at our Eel River and Sisson hatcheries, and to acquire two entirely new and modern patrol boats, without a cent of appropriation therefor.

Without this source of revenue it would be an absolute necessity, in order to keep up the standard of our hatcheries and maintain an efficient patrol over the commercial fisheries, to ask for a larger appropriation from the general fund of the State.

Should any change be deemed necessary in the present license law, it should in our opinion lie in the direction of a still higher fee from the alien who comes to our State to improve his condition, and in the majority of cases gives but little or nothing in return for the benefits he receives. It is well understood that an individual who engages in farming must first acquire land, for which he pays a fixed price, either in original cost or rental, in addition to which he must pay for the tools and seed to plant it; but the fisherman gets thousands of acres of water, rent free, and the State pays for the seeding of it; his only outlay is for the tools he works with, therefore he can well afford to pay a liberal license fee, which goes for the maintenance and betterment of the very industry out of which he earns a livelihood.

We are pleased to report the continued success of the hunting license law, now in its fourth year—the popularity of which is best shown by the returns. Our State took second place in the Union in its first year, being exceeded only by the State of Illinois, which has a population of 5,000,000, as against 2,000,000 for California. The total value of sales in Illinois was approximately $150,000.00; in California $118,000.00. There was a falling off in sales for the second year of about $3,500.00, due to the use of a metal tag for a license, which bore no identification other than a number, and rendered loaning and trading comparatively easy and detection of the offense very difficult. For the third year, ending June 30, 1910, the record shows a gain of $14,000.00 over the preceding year, or a grand total of $128,452.00. While some complaint has been heard regarding the use of a paper license, we feel the returns have fully justified the change. All states that have used a metal license have abandoned it in favor of a paper or cloth license, on which can be inscribed the purchaser's name, with his description and signature.

A recommendation, which had the universal endorsement of the sportsmen of the State, that a combined hunting and angling license be adopted, good for either hunting, or angling, for game fish, or both, we regret to say failed of final passage in the assembly. One most important point was gained, however, in making the law apply to the hunting of any wild birds and animals, as distinguished from *protected* birds and animals. This law removes all excuse for being out in the field without a license under the pretext of shooting unprotected game —a loophole that was quickly taken advantage of by most of the aliens, who would not take out a $25.00 license. It resulted in the sale of more alien licenses, but its best effect was shown in keeping them out of the field, where their indiscriminate slaughter of all kinds of song birds, as well as game birds and animals, is well understood.

The reduction in bag limits on quail, dove, snipe, curlew, ibis, plover, rail, and other shore birds from 25 to 20, and on wild ducks from 35 to 25, has met with the universal approval of all genuine sportsmen, the only exception being a complaint from some market dealers and hotels against the reduction in the bag limit on ducks. This complaint will continue so long as ducks may be bought and sold.

The two years close season on mountain quail and corresponding extension of the close season on grouse and sage hens was wise and timely. Both birds are showing a decided increase, and when the present restrictions expire September 1, 1911, and provision is made for bag limit and season, we believe that by a careful enforcement and observance of the law the supply will never be perceptibly diminished.

Our recommendation with regard to making it an offense to use any trained animal, except a dog, as a blind or means of approach for the purpose of killing wild ducks or other waterfowl became a law, and has materially benefited the duck situation by putting out of business some of the most notorious ''bull-hunters,'' against whom a vigorous campaign was waged. We confidently believe this season will put an end to their further operations.

While no recommendations were made by this Commission with reference to a change from the season when deer could be lawfully killed (July 15th to October 1st), a number of bills on that subject were introduced in both houses. After fierce debating and many amendments a compromise was finally decided upon, making an open season of three months, from August 1st to November 1st. Unfortunately through a clerical error, a misprinted bill, or one that never passed the Senate, fixing the open season July 15th to November 1st, received your signature. There being so much confusion over the matter, the Attorney General was appealed to and in an exhaustive opinion he advised us to recognize the open season from July 15th to November 1st, or three and a half months, and we have been governed accordingly. In our opinion this season must be shortened at least one month, and the opening date fixed at August 1st, closing date October 15th. While this still leaves a very generous open season, we believe the increase in deer in all the northern and central counties, also the counties reaching the Sierra Nevada Mountains, due to the bounty paid on mountain lions, will warrant it. The exception is in southern California, embracing the counties from San Luis Obispo southward, where, owing to devastations by forest fires, deer cover has been greatly reduced, and through remarkable increase in population with approximate increase in the number of deer hunters the deer have become scarce.

The legislature acted favorably upon our recommendation with respect to placing wild turkeys on the protected list. This action was timely, as the birds that had been liberated in the San Bernardino Mountains, Sequoia Park, eastern Tulare County, and in the Yosemite National Park are showing an encouraging increase.

The change in the law relating to pheasants, whereby the restrictions were removed from those raised in captivity, has proven of great advantage to pheasant raisers. It has given encouragement to many who had started in a small way and found themselves with a considerable number of birds on hand, and no legal means to dispose of them. It also permits them to be freely transferred from one part of the State to another and sold for purposes of propagation, but withholds the right to sell for market purposes. We believe, however, that further encouragement should be given by allowing those raised in captivity to be sold in the markets under proper restrictions.

Some important changes have also been made with respect to the laws governing the taking of fish. We recommended at the thirty-eighth session of the legislature that the law on crabs be changed by raising the then existing close season, September and October, and establishing in lieu thereof a close season of four months beginning November 1st and ending on March 1st of the following year While this was a step in the right direction, we do not consider it sufficient, and will recommend that a close season of two years be established.

The legislature acted favorably upon our recommendation with respect to establishing a close season for the taking of striped bass with nets or seines, fixing the time from the first of May to the first of July of each year, and permitting their capture by hook and line only during that period. A reduction was also made in the legal mesh of nets with which these fish could be captured from 7½ to 5½ inches. It seemed inconsistent that while striped bass might be taken and legally possessed weighing not less than three pounds, a 7½-inch mesh net would not capture one weighing less than five or six pounds. This offered a great temptation to the fishermen and resulted in many infringements. The legal mesh for the taking of salmon was also reduced from 7½ to 6½ inches.

Our recommendation for a close season of at least two years on lobsters or crawfish was met by fixing an indefinite close season on the taking of them in the waters of California, but permitting crawfish or lobster that were taken without the waters of this State to come in under prescribed restrictions.

Section 632½, referring to the steelhead trout, was amended by removing the close season that existed concurrent with the salmon law from September 17th to October 23d, and fixing a total weight limit in one day at 50 pounds. This met with much favor from all anglers.

The law was further amended by extending the open season and permitting their capture in any of the waters of the State from the first of April to the first of February of the following year, eliminating the tide water clause. So long as the prohibition against the taking of these fish with nets continues, no other restrictions are necessary. From a limited number of anglers a request was made asking that the taking of steelhead be permitted at all seasons of the year, with which we have not agreed, as we believe they should have protection while on their spawning beds—the principal months for which are February and March, the present close season.

During the thirty-eighth session of the legislature, the title of the Commission, which had remained the same since the establishment of this department in 1870, was changed from ''Board of Fish Commissioners'' to ''Board of Fish and Game Commissioners.''

To simplify the keeping of accounts, not only in our own office, but in the offices of the State Treasurer, State Controller, and Board of Examiners, the balances remaining in the fish commission fund and the game preservation fund were combined into one fund, known as the fish and game preservation fund, into which are paid all moneys arising from the sale of hunting licenses and of fines collected for violations of any of the fish and game, and fish and game license laws of the State, and providing further that this fund shall be applicable to the payment of the expense of propagating, protecting, restoring, and introducing *game fish* into the public waters of the State, and to the propagation, protection, restoration, and *transferring* of *game birds* and animals in this State, and to the *introduction* of game birds and animals into the State, and to the payment of the expenses incurred in the prosecution of offenders against the fish and game, and fish and game license laws of the State, and to all other necessary expenses approved by the Fish and Game Commissioners.

The State now appropriates only $20,000.00 per year, and that for the support and maintenance of the commercial hatcheries (being at the rate of only one cent per head on the estimated population of two millions), to which is added the amount, approximately $22,000.00, arising from the sale of commercial fishermen's licenses. This fund is applicable to the payment of the expenses of ''propagating, protecting, restoring, and introducing *commercial* fishes into the public waters of this State, and all other expenses pertaining thereto.''

The sportsmen who pay for hunting licenses are not contributing toward the support of the commercial hatcheries, as is sometimes charged. All fines of whatever character, amounting approximately to $20,000.00 per year, are paid into the fish and game preservation fund, which more than meets the expense involved in the propagation of game fishes.

Section 642 of the Political Code was amended by amplifying the powers of the Fish and Game Commissioners and their deputies, authorizing them to seize and take possession of any and all game or fish or any part thereof which have been caught, taken, killed, had in possession or under control, sold, offered for sale, or shipped, or offered for shipment, contrary to any laws of the State, and providing that any game or fish so seized shall be by them donated to some charitable or public institution. This amendment has proven of value, but far better results would be obtained were our deputies granted the ''right of search,'' following in that respect the example of New York, Maine, Minnesota, Massachusetts, Colorado, Washington, and many other states. The deterrent effect alone of such a law would be very great; it would simplify the work of our assistants, and, in short, its value to fish and game preservation can not be overestimated.

Another important amendment to this section gave the Fish and Game Commissioners the right to acquire, by lease or otherwise, such lands as may be deemed necessary for the purpose of establishing state game farms. Under this authorization we were able to carry out our plans and established our first game farm near Hayward, Alameda County.

ALLEGED TRUST OF DEALERS IN FISH.

This Commission views with approval the activity of the Attorney General and the district attorney of the city and county of San Francisco in investigating the alleged existence of an illegal combination or trust among fish dealers. Although such illegal combinations may affect species of fish propagated and distributed by this Commission and make it possible to sustain market prices by selling any surplus to fertilizing plants, investigations or prosecutions instituted thereon are entirely beyond and outside of the province of the Board, under the authority and powers now vested in it. And in this connection this Commission suggests to you that it might be advisable to call the attention of the legislature to the fact that an act regulating and licensing fish dealers by this body and give to it the necessary power to cancel such license upon conviction of violation of the laws protecting fish would be a most effective means of curbing such evils.

ARRESTS AND FINES.

The following statement gives in brief the history of our work as it relates to the efficiency of the patrol force. It indicates that the work has been thorough and far-reaching, and covers every class of offense relating to the fish and game laws, and it has reached practically every corner of the State. This statement is taken from the docket kept in our office, which shows all the cases in detail, but in a report of this kind it is necessarily abbreviated. Three fourths of the cases have been made by our regular deputies—the remainder by men of the United States Forestry Service and others interested in this work who have been empowered by us with authority to make arrests for violations of these laws. Especially good service has been rendered by forest rangers acting under service order No. 22, which is as follows:

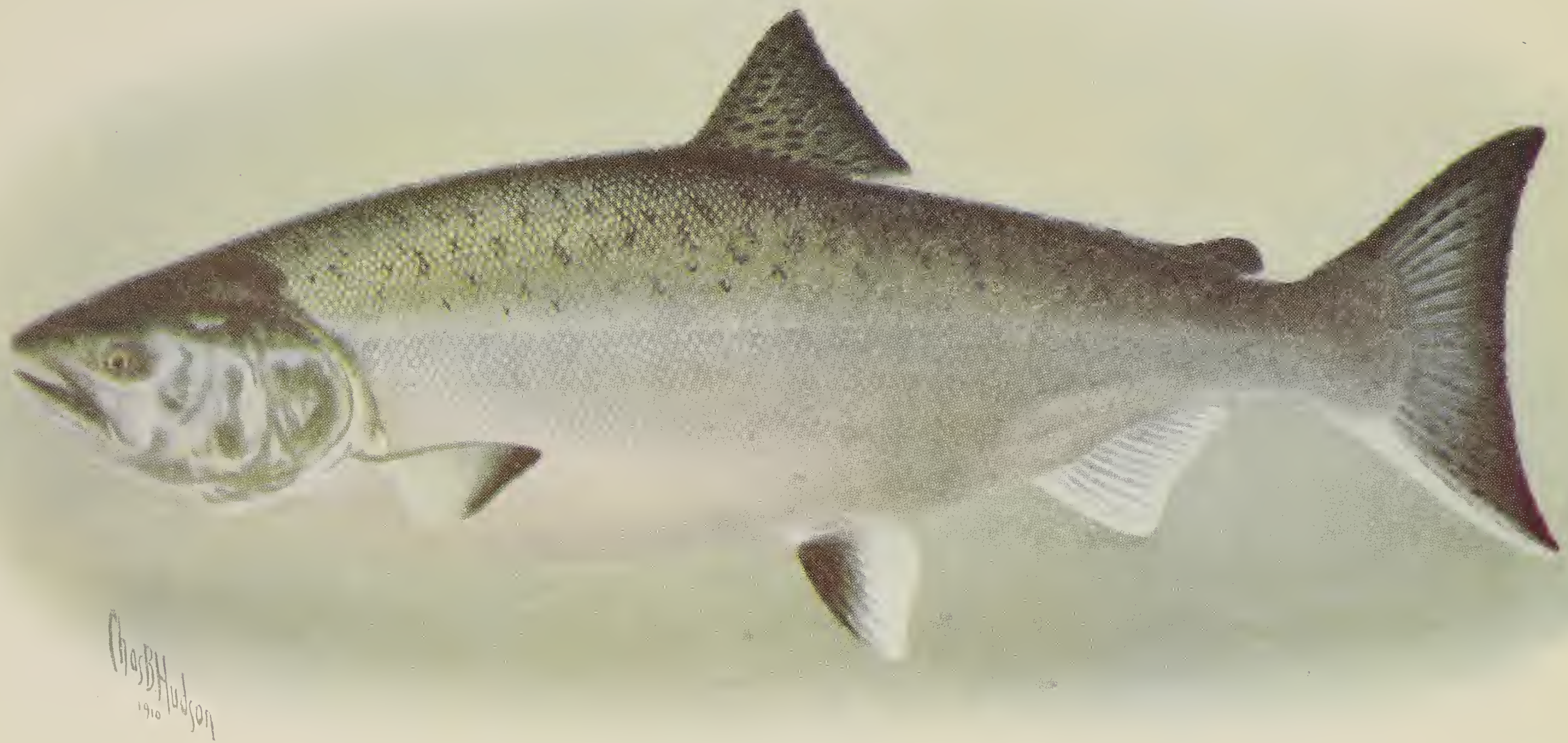
> SERVICE ORDER NO. 22.
>
> WASHINGTON, D. C., September 25, 1908.
>
> OBSERVANCE OF STATE LAWS BY FOREST OFFICERS.
>
> It has recently been brought to the attention of this Service that forest officers themselves have in rare instances failed to observe the State game laws. Strict observance, both by act and example, of all State laws, whether for the protection of game or for other purpose, is one of the first duties of every forest officer. Under no circumstances should one forest officer shield or condone the act of another who violates the game laws. To do so differs little from actual violation of the law itself. This Service will not tolerate violation of the State game laws by any of its members, or failure to coöperate fully with State game officials.
>
> GIFFORD PINCHOT, Forester.

We desire at this time to express our appreciation for the valuable assistance rendered by that department.

It will be observed that in by far the larger number of cases the defendants pleaded guilty, which may be taken as an indication of the thoroughness with which the evidence had been collected. But in addition to the cases which were actually brought into court, hundreds of complaints have been examined, some of which we found had not been made in good faith; others in which sufficient evidence was not obtainable to justify a prosecution.

Many seizures of fish and game that had been shipped (or offered for shipment) in violation of the statutes, or had been killed contrary to law, were made. In many of these cases, convictions followed the seizure. In others, owing to use of fictitious names, we were unable to locate the shipper, but some punishment was effected by confiscation of the game or fish, which meant a loss of time, labor, and the goods.

At the thirty-eighth legislative session the right was given to the Fish and Game Commissioners and assistants to seize and take possession of any and all game or fish, or any part thereof, which had been taken, killed, or had in possession or under control, or sold, or offered for sale or shipped, or offered for shipment, contrary to any of the laws of this State. It provided further that all such game or fish, or any part thereof, which might be so seized or taken possession of by the Fish and Game Commissioners, or their assistants, shall be donated by them to some charitable or public institution. Practically all institutions of that character in and around San Francisco and the other larger cities of the State have been beneficiaries under this law, and from many of them we have received grateful letters of acknowledgment.



QUINNAT SALMON (Onchorhynchus chouicha)

DRAWN FROM FEMALE FISH TAKEN AT MONTEREY, CAL., MAY 1910

FISH CASES.

Summary of arrests made by deputies of the Fish and Game Commission, and disposition of cases for two years, ending August 31, 1910.

Number of arrests	Violation charged with.	Convicted	Acquitted	Dismissed	Fine.	Number of days' imprisonment
85	Fishing without a license	78	1	6	$820 00	100
57	Young of fish, catching or possession	31	------	26	695 00	------
62	Using Chinese shrimp or bag nets for the purpose of taking fish (43), close season (11), exporting (8)	40	------	22	3,630 00	------
36	Using small mesh nets to take striped bass	9	2	25	625 00	550
35	Using set nets to take salmon and striped bass (1 pending)	29	------	5	2,900 00	275
14	Nets extended more than one third across stream (striped bass)	4	1	9	425 00	------
6	Using wire traps or nets for the purpose of catching fish	6	------	------	575 00	------
20	Using explosives	14	1	5	926 00	1,062
13	Polluting waters of State (sawdust, oil, etc.). See note	1	2	10	250 00	------
3	Taking fish within 50 feet of fishway	1	------	2	100 00	------
21	Salmon, catching or possession, close season (2 pending)	6	------	13	950 00	------
6	Saturday and Sunday fishing for salmon, shad, and striped bass	2	------	4	210 00	------
40	Striped bass, underweight, catching or possession	34	1	5	775 00	------
1	Sturgeon, catching or possession, close season	1	------	------	20 00	------
23	Black bass, close season, bag limit, catching by other means than hook and line, etc.	23	------	------	620 00	130
2	Sacramento perch, close season, spearing, etc.	2	------	------	25 00	20
82	Trout, close season, bag limit, undersized, buying or selling underweight, etc.	65	2	15	1,415 00	185
28	Steelhead, close season, spearing, etc.	16	2	10	300 00	------
2	Golden trout, close season, bag limit, etc.	2	------	------	50 00	------
162	Crabs, close season, undersized, female	110	------	52	1,990 00	103
18	Abalones, close season, possession	14	2	2	345 00	------
20	Crawfish, close season, undersized	16	2	2	355 00	------
8	Catfish, undersized	5	------	3	125 00	------
7	Taking surf fish by other means than hook and line	7	------	------	130 00	------
1	White fish, catching or possession	1	------	------	20 00	------
2	Lobsters, illegal shipping	2	------	------	------	150
754	Totals	519	16	216	$18,276 00	2,575

Three cases pending.

NOTE.—In these cases, all of which represent actions against corporations, the charges were dismissed after the court and the board were satisfied that the repair and other work done by the defendants, amounting in the aggregate to $39,650, rendered further pollution impossible.

GAME CASES.

Summary of arrests made by deputies of the Fish and Game Commission, and disposition of cases for two years, ending August 31, 1910.

Number of arrests	Violation charged with.	Convicted	Acquitted	Dismissed	Fine.	Number of days' imprisonment
351	Violation of hunting license law (2 pending)	300	10	39	$3,936 50	20
42	Doves, close season, killing or possession	38	3	1	945 00	------
2	Doves, bag limit, concealed package	2	------	------	75 00	------
3	Doves, buying or selling	3	------	------	75 00	------
22	Ducks, close season, killing or possession	15	5	2	418 00	2
66	Ducks, bag limit (1 pending)	45	4	16	1,345 00	------
5	Ducks, netted (drowned)	3	------	2	75 00	------
1	Ducks, illegally shipped, concealed package	1	------	------	25 00	------
6	Shooting ducks from power boat while in motion	4	1	1	70 00	------
13	Using a trained animal for the purpose of killing wild ducks or geese	3	10	------	50 00	------
34	Night shooting (2 pending)	17	6	9	375 00	------

GAME CASES—Continued.

Number of arrests	Violation charged with.	Convicted	Acquitted	Dismissed	Fine.	Number of days imprisonment
10	Shooting on enclosed grounds (trespass)	8	------	2	$140 00	------
4	Hunting on Pinnacles National Forest Reserve without permit, and State game preserve	4	------	------	220 00	------
4	Mountain quail, killing or possession	4	------	------	100 00	------
72	Quail, close season, killing or possession	62	1	9	1,747 00	103
10	Quail, bag limit	5	------	5	200 00	------
5	Quail, buying or selling	2	------	3	150 00	------
5	Trapping quail or having quail or quail eggs in possession without permit, illegally shipped	5	------	------	100 00	------
9	Snipe, close season, bag limit, etc.	7	------	2	175 00	------
10	Curlew, rail and plover, close season	7	------	3	175 00	------
105	Non-game birds, meadow larks, robins, eagle, condor, swans, sea gulls, and other shore birds	84	2	19	1,135 00	------
2	Pheasants and Hungarian partridges, close season	1	------	1	25 00	------
105	Deer, killing, pursuing, possession, close season, illegally shipped	82	9	14	2,149 00	61
6	Deer, bag limit	4	2	------	65 00	35
17	Deer, pursuing with dogs	12	1	4	225 00	60
56	Female deer and fawns, killing (2 pending)	36	8	10	1,747 00	143
26	Female deer or spotted fawn hides in possession and deer hides in possession, evidence of sex removed	9	10	7	250 00	25
3	Deer hides, buying or selling (2 pending)	1	------	------	25 00	------
1	Elk, killing or possession	1	------	------	50 00	------
4	Antelope, killing	1	------	3	75 00	------
18	Tree squirrels, close season, killing or possession	15	2	1	350 00	------
1,017	Totals	781	74	153	$16,492 50	449

NOTE.—Nine cases pending.

SEIZURES OF NETS, FISH, AND GAME MADE BY DEPUTIES.

September 1, 1908, to September 1, 1910.

49	set nets. Owners unknown. Destroyed under section 636*a*, Penal Code.
11	small mesh nets (salmon and striped bass). Owners unknown. Destroyed under section 636*a*, Penal Code.
22	Chinese shrimp nets.*
3,248	pounds of salmon. Donated to charities.
8,157	pounds of striped bass. Donated to charities.
1,510	pounds of black bass. Donated to charities.
2,842	pounds of steelhead trout. Donated to charities.
2,272	pounds of trout (rainbow, Eastern brook, and cut-throat). Donated to charities.
725	pounds of shad. Donated to charities.
880	pounds of catfish. Donated to charities.
580	pounds of small smelt. Donated to charities.
417	pounds of crawfish. Donated to charities.
628	crabs. Donated to charities.
236	abalones. Donated to charities.
87,290	pounds of California shrimp shells.†
1,255	pounds of California shrimps† (dried).
380	dozen ducks. Donated to charities.
14	dozen doves. Donated to charities.
34	dozen quail. Donated to charities.
7	dozen snipe. Donated to charities.
1	dozen gray squirrels. Donated to charities.
14	dozen plover. Donated to charities.
30	dozen non-game birds. Donated to charities.
425	dozen murre eggs. Donated to charities.
162	rabbits. Donated to charities.
250	pounds of venison. Donated to charities.

---

*Returned after settlement of cases.

†Returned to the owners by order of the court.

The above table indicates that upwards of 20 tons of fresh salmon* were seized which had been shipped into the State contrary to law. Over 40 tons of dried shrimp and shrimp shells*; upwards of four tons of striped bass; more than two tons of trout of the different varieties; more than 1,500 pounds of black bass, were seized, all of which indicates the vigilance of our patrol force.

The set nets and small mesh nets that were taken, and by order of the court destroyed, represented a considerable money value and miles of netting. There were fewer arrests of individual fishermen for violation of the salmon and striped bass laws than in the two preceding years, owing, we believe, to the watchfulness of our patrol and the successful prosecutions that followed, especially in Solano County. This also accounts for the larger number of seizures of illegally used gear, as fishermen rather than risk being caught in the use of the nets would set and leave them, returning when the time seemed most favorable to avoid detection. A conservative estimate of the total value of the illegally used nets destroyed is $10,000.00.

As to game, upwards of 380 dozen ducks, 34 dozen quail, 14 dozen doves, 30 dozen non-game birds of different varieties, besides snipe, plover, gray squirrels, and rabbits were seized and donated to different charities in and around San Francisco, the Almshouse being one of the largest beneficiaries. Grateful letters of acknowledgment have been received from many of these institutions.

For the two years ending August 31, 1910, the total number of arrests made is 1,771, as against 1,192 for the preceding two years, showing a gain of 579. Of this number 752 were for violations of the fish laws, and 1,017 for violations of the laws relating to game. The total amount of fines imposed aggregate the substantial sum of $34,768.50. Of this amount $18,276.00 was paid for violations of the fish laws, and $16,492.50 for violations of the game laws. In some cases the defendants served time and paid a small amount into the county treasury. In other cases the magistrate imposed a fine without alternative, thus giving the defendant an opportunity to seek new fields. The total number of days' imprisonment served for violation of the laws aggregated for the biennial period 3,024 days.

The largest aggregate *amount in fines imposed* for violations of any single section of the Penal Code was upon the Chinese shrimp fishermen and dealers engaged in the capture and handling of California shrimp, for which 119 arrests were made, penalties imposed amounting to $4,325.00. The largest number of *arrests* for violations of any one section was for infractions of the hunting license law in various forms, 351 men having been apprehended during the two years, and a total of $3,936.50 imposed in fines.

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*Returned to the owners by order of the court.

The next in number of arrests was for violations of various sections of the laws relating to the protection of deer, for which offenses 211 arrests were made, of which 56 were for killing does or fawns, and for which fines amounting in the aggregate to $1,747.00 were imposed.

Seventeen arrests were made for running deer with dogs, out of which 12 convictions were obtained; 6 arrests were made for exceeding the bag limit on deer, 27 for violating the laws relating to possession and sale of illegal deer hides. For fishing for profit, without a license, 85 arrests were made, and fines amounting to $820.00 imposed, as compared to 5 arrests for this offense in the preceding biennial period.

FINANCIAL STATEMENT.

The resources and expenditures of this Commission for the sixtieth and sixty-first fiscal years, beginning July 1, 1908, and ending June 30, 1910, are shown as follows:

SIXTIETH FISCAL YEAR—1908 AND 1909.

	Resources.	Disbursements.
Support and Maintenance of Hatcheries Fund—		
Appropriation for year	$20,000 00	
Amount drawn during the year		$20,000 00
Restoration and Preservation of Game—		
Appropriation for year	10,000 00	
Amount drawn during the year		10,000 00
Restoration and Preservation of Fish—		
Appropriation for year	10,000 00	
Amount drawn during the year		10,000 00
Fish Distribution Car—		
Balance on hand July 1, 1908	2,041 24	
Amount drawn during the year		2,041 24
Appropriation for Fish Repository in Tuolumne County—		
Balance on hand July 1, 1908	200 05	
Balance on hand June 30, 1909		200 05
Game Preservation Fund—		
Balance on hand July 1, 1908	73,359 66	
Receipts from hunting licenses	113,476 93	
Receipts from fines	15,565 41	
Fish Commission Fund—		
Balance on hand July 1, 1908	6,391 04	
Receipts from fisherman's licenses	6,647 50	
Receipts from eggs sold to Germany	375 00	
Amount drawn during the year on these two funds, which were combined by law March 15, 1909, includiung expenses June, 1908		139,162 52
Balance on hand July 1, 1909		76,653 02
Totals	$258,056 83	$258,056 83

SIXTY-FIRST FISCAL YEAR—1909 AND 1910.

	Resources.	Disbursements.
Support and Maintenance of Hatcheries Fund—		
Appropriation for year	$20,000 00	
Receipts for fisherman's licenses	21,982 50	
Amount drawn during the year		$41,982 50
Fish and Game Preservation Fund—		
Balance on hand July 1, 1909	76,653 02	
Receipts from hunting licenses	126,734 35	
Receipts from fines	19,789 27	
Game farm earnings	938 22	
Amount drawn during the year		150,796 65
Balance on hand June 30, 1910		73,318 21
Appropriation for Fish Repository in Tuolumne County—		
Balance on hand July 1, 1909	200 05	
Balance on hand June 30, 1910		200 05
Totals	$266,297 41	$266,297 41

In the Appendix will be found a report on the books and accounts of this Commission by Price, Waterhouse & Co., "Certified Public Accountants," for the biennial period ending June 30, 1910, and an additional report on account of the years 1910–11, from July 1st to August 24th, 1910, inclusive.

SISSON HATCHERY.

This station is operated under the supervision of Mr. W. H. Shebley, whom we regard as one of the ablest and most skillful fish culturists of this country. Combined with his good practical judgment, Mr. Shebley unites the results of twenty-five years' experience and deep study of the scientific side of all questions relating to fish culture—with special reference to salmon and trout. The splendid results accomplished at this hatchery are due almost solely to the intelligent zeal with which this work has been carried on under Mr. Shebley's direction. With regard to its location and equipment, it has no superior in this country or any other.

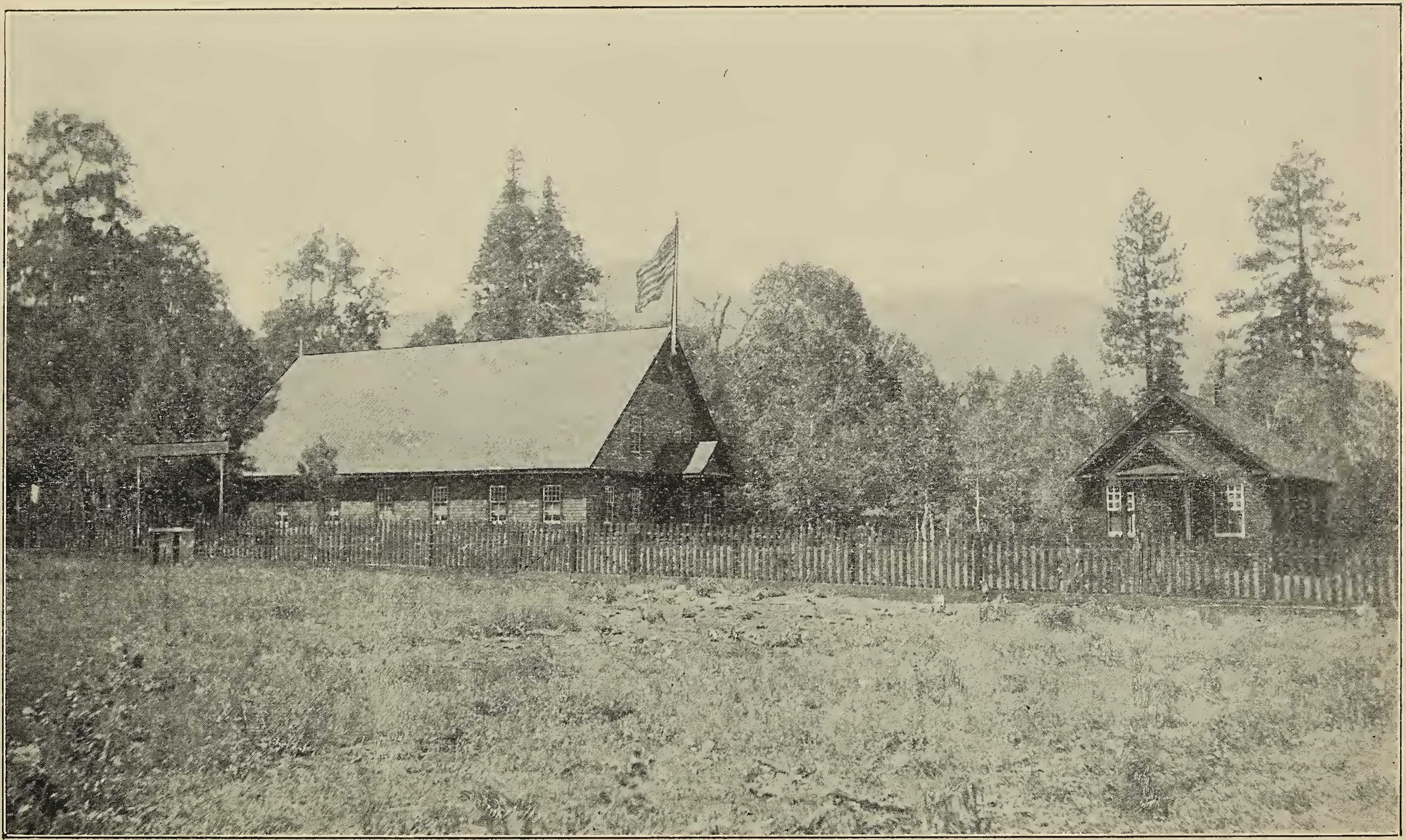
While the output of salmon fry was less than in the preceding biennial period, this was not due to a scarcity of salmon at the spawning stations or lack of effort on the part of the employees of the United States Federal Bureau of Fisheries to capture them. Unusual freshet conditions prevailed, which raised the waters to such a stage on the McCloud River and in Battle and Mill creeks that thousands of salmon impounded between the racks were permitted to escape, either by swimming over the obstructions or by the carrying out of entire sections; although comparatively a smaller number of eggs were taken, a high percentage of hatch was achieved. On the other hand, the output of trout fry from this station has enormously increased.

For the purpose of comparison, we submit the following statement showing the output of this station in 1900, or ten year ago, with the output for the present fiscal year, also an interesting view of the hatchery taken twenty years ago:

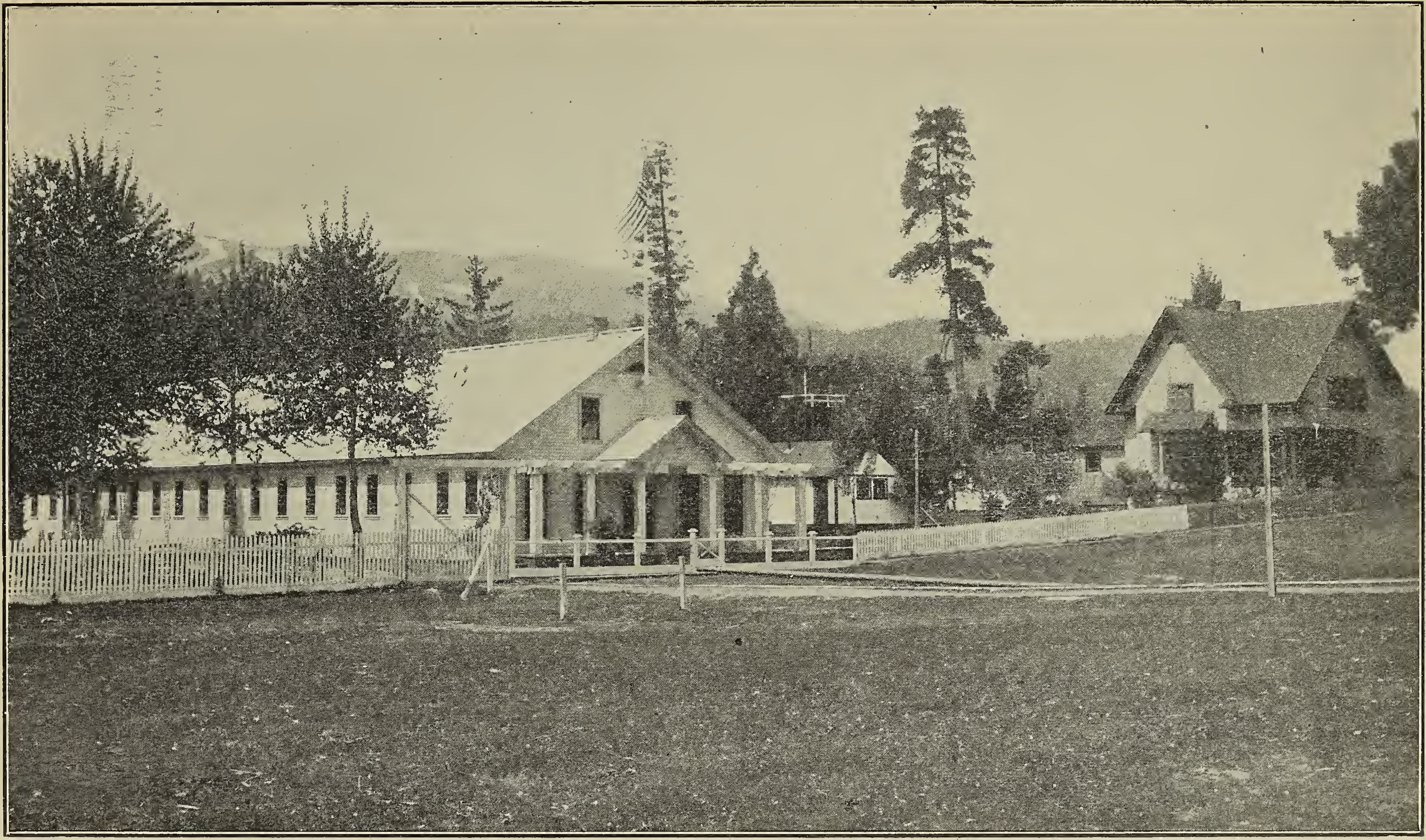
	1900.	1910.
Salmon fry	1,651,000	22,500,000
Rainbow trout fry	560,000	5,205,000 *120,000
Cut-throat trout fry	90,000	150,000
Loch Leven trout fry	264,000	1,484,000
Eastern brook trout fry	6,000	1,000,000
Steelhead trout fry	----------	303,000
German brown trout fry	136,000	----------
Totals	2,707,000	30,762,000

*120,000 hatched at Shovel Creek.

While the total distribution from this station for the year 1907 reached 67,000,000 and 60,000,000 in 1908, this was due to the larger



Tallac Hatchery.



Hatchery "A," Sisson, 1910.

number of salmon eggs that were collected at the three Federal salmon egg-collecting stations.

The work of the Federal Bureau of Fisheries is under the able direction of Capt. G. H. Lambson, who confidently expected to break all records in the number of eggs collected during the fall of 1909, there being more spawning fish impounded between the racks than at any time in the fifteen years he has operated on the streams in our State. The unusual November rains brought such a flood down Battle Creek that the racks, piling, and all were swept out, and the water continued at such a high stage that it was impossible to replace them until after the entire run of salmon had passed on to head waters. For details of the work that has been performed at Sisson for the past four years, we refer you to Mr. Shebley's reports, which will be found in the Appendix.

This station is now in first class condition, and the improvements are all of a substantial and permanent character and will require only the ordinary charges of maintenance.

THE SALMON LAW.

At the thirty-eighth session of the legislature we recommended a change of five days on the close season for the taking of salmon. We suggested that the close season begin on the 15th of September instead of September 10th, and end October 21st instead of October 16th. There was a general complaint from the canneries and cold storage plants to the effect that the fall run of salmon was appearing later; that the close season commenced before the run had reached its height, and that the bulk of the fish were passing the fishing grounds during the close season. Together with the fisherman, they asked for two weeks' extension of the open season. It resulted in a compromise, and a change of one week was effected. The close season now begins September 17th and ends October 23d. No change, however, was made in the very important feature of the law which prohibits the taking of salmon above tide water before the 15th of November. For years the importance of the tide water clause was imperfectly understood, and provoked a great deal of criticism from the fisherman living along the upper Sacramento and San Joaquin rivers, who did not realize that but for this restriction there would be nothing to prevent many of the five hundred boats that fish in the lower rivers from following the schools of salmon up the rivers, which would result in practically capturing all of them before reaching the spawning grounds. Without the protection given the salmon under the law, the Federal Bureau of Fisheries stations would not be able to take a sufficient number of eggs at the spawning stations to justify carrying on the work of artificial propagation, which has been the salvation of the salmon supply in our waters, and would in a very short time result in the extermination of the species in the Sacramento River.

The high price of salmon that has prevailed for the past three or four years has been an incentive for more men to engage in the business. The improved method of handling the fish and the better transportation facilities have given the Sacramento salmon almost a world-wide market, which was fully set forth in our nineteenth biennial report. The constantly increasing market is a most important factor in keeping up the price; and this induces the fishermen to extra effort, which is shown on the upper Sacramento, where by the removal of snags and other obstructions in the river new seining grounds have been cleared off, permitting the operations of more nets during the spring run. This has had the effect of reducing the take of eggs from the summer run at Baird Station. We see no reason for any change in the law as it applies to the fall run, but it is not at all unlikely that additional restrictions may be necessary upon the capture of the spring run in order to permit a larger number of parent fish to reach Baird. As the spring fish commands about double the price of the fall run, such a recommendation would meet fierce opposition; nevertheless, if careful investigation shows that increased spring fishing decreases the supply of parent fish at the hatcheries, such additional restrictions should be imposed in spite of any opposition.

At the thirty-eighth session of the legislature we recommended that the mesh of net with which salmon could be legally taken should be reduced from 7½ to 6½ inches. This recommendation which had the endorsement of Dr. C. H. Gilbert of Stanford University, who has made a very careful study of the subject, became a law. A recommendation on the same lines had been made by the late Cloudsley Rutter, who was considered one of the best informed authorities on the Pacific coast salmon. He found that a great many small but matured fish were passing through the nets and making their appearance in large numbers between the racks at the spawning stations, where they were regarded as a nuisance. It is not considered desirable to breed from the smaller stock. As these fish have a positive food value before reaching the headwaters of streams, where they spawn and die, it was considered that an important food supply was being wasted, when with a smaller mesh net they would be captured while in prime condition for fresh market use. It was found that the fishermen operating in Eel River, also in the upper Sacramento, who use cotton nets, which were of legal size when new, but shrunk to 6½ inches when in actual service, were substituting sections of still smaller mesh. We therefore recommended another amendment, making it unlawful to use a net for the taking of salmon, shad or striped bass, "any of" the meshes of which were less than prescribed by law. We also had substituted the word "use" for the word "set" in section 636. This also removed another legal snag that had caused the dismissal of several cases, as it had been successfully argued that the law was misleading; that it was not a positive prohibition against setting a net, and it had been so construed in one or two cases. We have now a better and more closely drawn law, the provisions of which can not be so easily evaded.

To further advance the salmon interests, we have with the coöperation of the Federal Bureau of Fisheries undertaken the establishment of a salmon egg-collecting station on the Klamath River in Siskiyou County, near the town of Klamathon, the expenses of installation to be borne jointly, the Bureau to pay operating expenses, and the hatching and distribution to be done at and from Sisson at our expense.

That the supply of salmon in the waters of this State is not only being maintained but positively increased through artificial propagation, there can be no question. The federated commercial bodies of Humboldt County in a petition to this Board, under date of May 27, 1910, asking that the capacity of the Eel River Hatchery be increased, call attention to the fact that "beginning in 1901, four years after the hatchery was established, the amount of fish caught increased very rapidly, so that for the five years 1903–1907, inclusive, the annual average of shipment was over 3,000,000 pounds, as against an annual average of about 300,000 pounds before the hatchery was established."

In spite of such trustworthy evidence there are still some who fail to appreciate what has been accomplished, and look upon the artificial propagation of fishes with mild toleration, and point backward to the "good old days" when "a man could cross the river on the backs of the salmon without getting his feet wet."

In support of our contention and as evidence of the value of our work, we append herewith three comparative tables showing the number of pounds of salmon taken in three periods of four years each, the first commencing in 1874 (or thirty-six years ago), and extending to August, 1878, the second showing the amount taken (each year) for the years 1893–94–95–96, and the third being *an approximation* of the number of pounds of fresh salmon taken in 1907–08–09–10.

Years.	Pounds.
1874-1875	5,098,781
1875-1876	5,311,423
1876-1877	6,492 563
1877-1878	6,520,768

It was submitted by the Fish Commissioners in their report for the years 1878–79 to Governor Wm. Irwin that "to the weight of salmon actually taken to market by rail and steamboat, and the salmon actually tinned, we have added 25 per cent, the total being a close approximation of the actual catch for the season.''

The following figures for the years 1893 to 1896, inclusive, were taken from the books of dealers and transportation companies and display the actual catch of those years:

Years.	Pounds.
1893	3,950,373
1894	4,494,618
1895	4,350,375
1896	3,276,587

It will be observed by reference to the second table that there was a decided decrease; but dating from that time a remarkable increase is shown, due to larger experience and improved methods; but the most important factor was the establishment of more spawning stations, beginning with one established by this Commission on Battle Creek, Shasta County, in 1895. This station produced in its first year of operation upwards of 14,000,000 salmon fry, which exceeded the total number ever planted in any previous four years and marked the commencement of a new era in salmon propagation. The United States Bureau of Fisheries located in 1901 a spawning station on Mill Creek, in Tehama County, and also acquired from the State its property and rights on Battle Creek, and has continued to operate with great success both stations, delivering to us free of cost practically the entire output of these stations and a large proportion of those taken on the McCloud River.

Years.	Pounds.
1907	9,111,200
1908	8,001,750
1909	11,211,400
1910	10,256,600

The third table, submitted by us, is based on the number of tierces of salmon actually packed, of which there is a record furnished by Mr. F. E. Booth of the Sacramento River Packers' Association, and to which is added an estimate made by dealers of the number of pounds of fresh salmon sold in the San Francisco markets. We do not include the fresh salmon which is shipped from Tehama and Chico into Oregon and Washington, nor from Sacramento to Eastern States, nor that which is sold and consumed in the local markets of Sacramento and Stockton, which, based on such figures as are obtainable, approximates 800,000 pounds annually.

STRIPED BASS.

From the commercial standpoint, the striped bass stands next in value to the salmon as a food fish in this State. It is also one of the most highly prized of the game fishes, being eagerly sought after by thousands of anglers throughout the State. The principal breeding grounds, so far as we have been able to determine by close observation of the subject for the past three years, are in the deltas of the Sacramento and San Joaquin rivers, although after spawning they range well into the interior of the State. Specimens have been taken in the Sacramento River as far northward as Kennett, in the Feather River above Oroville, and in the San Joaquin River as far upstream as Polasky. As a table fish they are second to none, and the question of maintaining the supply in the State has received our earnest consideration. In the nineteenth biennial report, considerable attention was called to the advisability of attempting to increase the supply by artificial propagation. The funds of this Commission at that time being insufficient to bear the expense unaided, the subject was taken up with the authorities of the United States Bureau of Fisheries at Washington, with the result that Capt. G. H. Lambson, in charge of the salmon hatching work of the Federal Bureau of Fisheries in California, was instructed to coöperate with this Board. Accordingly, in the month of May, 1907, operations were commenced at Bouldin Island, on the San Joaquin River, at which point a small hatchery building was constructed at the expense of this Commission. A small pumping plant for the purpose of raising water into two tanks of 2,000 gallons each to furnish the necessary amount of water for hatching operations was also installed. The equipment of the hatchery, McDonald hatching jars, were furnished by the United States Bureau of Fisheries. That department furnished three, and this Commission two men, but we assumed the expense of boat hire. During the first season we worked considerably in the dark. There was much to be learned concerning the habits of the fishes; how to distinguish those that were ready for spawning from the immature ones. It was found that by the same methods followed in "stripping" trout and salmon, the eggs and milt could be taken from striped bass, and yet neither the eggs nor milt be sufficiently matured to insure fertilization. The result was many eggs were taken that were apparently ripe, but which could not be definitely determined until after the eggs were placed in the hatchery Our total take of eggs for the first year's operations was upwards of eighteen million, which is about three times the amount of which there is any record that were taken on the Atlantic coast in a single season. The percentage fertilized and hatched, however, was small, and although we met with many discouragements, we were greatly pleased at the results that were obtained from certain lots of eggs. For example, in one lot of nearly 500,000 eggs, 95 per cent of hatch was achieved; in another 81 per cent.

During the past two seasons much attention was given to the movements of the striped bass before and after spawning, to trace the migration of both adult and young fish, which involved considerable exploration work. This, together with the scientific work, was under the direction of Mr. N. B. Scofield, a scientist, formerly of Stanford University, assisted by Mr. George A. Coleman, a biologist of experience. The station was supplied with a sufficient laboratory outfit to carry on a series of scientific investigations and studies, the results of which are shown in the Appendix, together with considerable data on the hatching of striped bass eggs, food of young striped bass, "Explorations made in connection with the work at Union Island, San Pablo Bay, and tributaries thereto," and the general report on the work for the season of 1909–10 by Mr. Scofield.

We recommended the establishment of a close season against the use of nets during the principal spawning months, May and June, but leaving the season open all the year so far as taking these fish with hook and line is concerned. We have been well satisfied with the results that have followed these amendments.

In the line of further recommendation, we would again call attention to the recommendation in the nineteenth biennial report of this Commission as follows:

> Another plan offered to offset the drain on the striped bass industry of this State is the passage of a non-export law, and there is much to be done in its favor. Our streams do not increase in volume; in fact, from the demands made by irrigating systems, it is possible to conceive that they will be reduced. It may then be the part of wisdom to conserve these valuable fishes for the citizens of our own State. Undoubtedly such a recommendation would meet with fierce opposition from the fish dealers in this city and Sacramento, who ship outside of the State thousands of pounds of striped bass each month. We feel that if these shipments may continue without impairment of the industry, and yet not run the local market value of these fish to a prohibitive figure, it would be an unwise move to prohibit their exportation.

Since this report was made the price of striped bass in our markets has reached a figure that is almost prohibitive to the man of small means. To supply the demand of the markets outside of this State we can offer an unlimited supply of a most delicious and valuable fish—the shad.

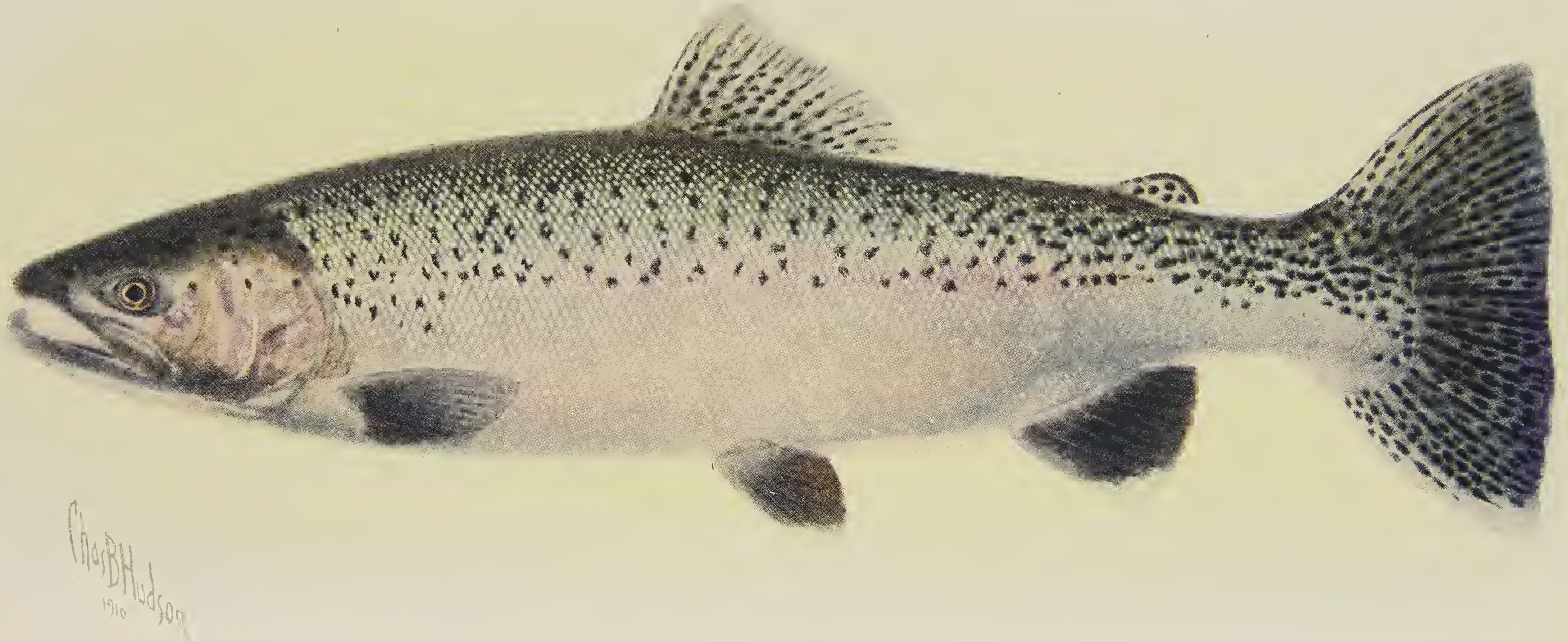
We believe that if the shipment of striped bass out of the State is prohibited, and the work of artificial propagation further developed, the result would show not only a decided increase in the supply, but a reduction in price to the average consumer of from 25 to 50 per cent.

In the line of distribution, a car load of these fishes ranging in size from 6 inches to 4 pounds in weight was collected in the Straits of Carquinez, at Port Costa, within two miles of where the original plant of bass was made twenty-seven years ago. They were transported without loss of a single fish to southern California and distributed in suitable waters of limited area in Orange County. This being the third shipment made into these waters in the past eight years, it should be sufficient to determine beyond all question their adaptability to the conditions found there. The natural range in this State seems to be from Monterey Bay northward as far as the mouth of Russian River, in Sonoma County.

THE TROUT LAW.

The opening date for the taking of trout was changed at the thirty-seventh session of the legislature from April 1st to May 1st. As compensation, the open season was extended two weeks from November 1st to November 15th, giving an open season of six and one half months. It applied to all varieties of trout except the steelhead, which could be legally taken, beginning April 1st, in tide water; but during the thirty-eighth session, the tide water restriction was removed, so they may be taken wherever found, beginning April 1st. While this has led to some confusion as to the identity of a steelhead, we believe that in the main the change has met with favor. Practically all the fish in our coast streams are of the steelhead variety. Under normal conditions the larger fish by the 1st of May have nearly all gone to sea or are hovering around in the deep pools from which they have easy access to the ocean when necessary to go there for food and protection. With the season opening on April 1st, thousands of our people who can not afford the expense of trips into the higher mountains would lose their only opportunity to catch trout, therefore we are not inclined to recommend any change of the opening date, as applied either to the steelhead or other varieties. We are, however, strongly of the opinion that six months of open season on all trout, except steelhead, beginning May 1st and ending November 1st, is ample and more liberal than any other state in the Union. Many eastern states grant only a three months' open season. Long before the 15th of November all genuine anglers have left the higher altitudes, and no sportsman really desires to take trout after that time, the exception being the market fisherman, the legality of whose operation can always be questioned. He fishes from the beginning of the season to the end, and takes advantage of every loophole in the law. Fish that happen to be of legal size are sent to market, everything under a pound in weight is disposed of through evasion or subterfuge. The two weeks now allowed in November simply give an additional opportunity to the market fisherman to deplete the streams when the fish are easily taken with bait. We, therefore, feel that the best interests of most of our people will be served by closing the general trout season on November 1st.

During the past two years efforts have been made in the direction of



STEELHEAD TROUT (*Salmo gairdneri*)

DRAWN FROM MALE FISH 23 INCHES LONG, TAKEN AT SWANTON, CALIF., FEBRUARY. 1910

raising trout artificially for market purposes. Enough has been accomplished to show that a new and profitable industry can be created in this State if an exception is made in the general law on trout in favor of those raised by private enterprise, by reducing the weight limit or size at which they can be legally sold. In a number of states in the Union—Utah, New York, Massachusetts, and Washington—it has developed into a profitable business. We believe in encouraging similar effort in our State. It would enable citizens and taxpayers to engage in a legitimate industry and supply with trout not only hotels and restaurants but the general public, without any drain whatever on the streams. This would in a short time, we believe, permit of a non-sale law on wild trout—a measure greatly desired by all anglers, as well as thousands of others who are not known as sportsmen, and yet enjoy their summer outings, provided the supply of trout in the mountain streams is maintained, which is almost impossible so long as the market fisherman has some shadow of legal excuse to ply his vocation. We believe our State offers excellent opportunities for the establishment on legitimate lines of such enterprises, which would mean the establishment of new industries, new avenues for profitable labor, with benefit alike to the angler for sport and those whose only opportunity to acquire trout is by purchasing them in the markets. We believe that the experience of other states would be a safe guide for us to follow, with regard to size and other restrictions that should be placed on the handling of trout raised in captivity to properly distinguish them from the wild trout of the streams and lakes.

TAHOE AND TALLAC HATCHERIES.

Since the last detailed biennial report of this Commission was printed important improvements have been made at these stations.

For several years we have had difficulty in getting a sufficient amount of good water to operate the Tallac Hatchery, besides which, its location was always a drawback, consequently a change was deemed advisable. After examining several sites offered by Messrs. Comstock and Lawrence, it was finally decided to locate the new hatchery on Taylor Creek at a point less than one half a mile above the spawning station. This creek, which furnishes our main source of supply of cut-throat trout eggs, is also the outlet of Fallen Leaf Lake, which will guarantee our water supply.

We were fortunate in securing a ten-year lease from the late Mr. E. J. Baldwin for three acres of ground, more or less, with water rights sufficient to operate the hatchery. The advantages of this location are many. In the first place it avoided hauling the eggs some three miles from the spawning grounds by sled over the snow to the old hatchery site, at which point there were no accommodations for the men. After the new site was decided upon, proper surveys were made and a concrete dam 75 feet long was placed in Taylor Creek to divert water into an iron pipe line, approximately 900 feet long. This pipe line was put underground and only emerges to the surface when the settling tank is reached. A building 40 by 70 feet, resting on concrete foundation, was then erected. Following the suggestion of Superintendent W. H. Shebley of our Sisson Hatchery, a radical departure was made in the arrangement of troughs. Instead of having a head trough on one side or end of the building, two head troughs were placed—one on each side of the building—permitting an aisle through the center.

The abundance of water permits each trough to be fed separately, and overcomes the disadvantages of having one feed into another—conveying excrement and possible disease into the lower one. The building was very solidly constructed, shingled overall, and forty troughs were installed, which give a capacity of about three million eggs, as against a million in the old hatchery. The total cost of this station complete was $3,534.00, which included all the labor and material used in its construction. It was paid for out of the fish commission fund. In the fall of 1909 a four-room cottage for the men was constructed in the enclosure of the hatchery grounds, at a cost of $750.00. This work was economically and substantially done. We believe for its purpose a more complete hatchery station can not be found.

At the Tahoe Station important improvements were also made. The foundation under the hatchery, which had done duty for many years, was taken out and entirely renewed, new porches added to hatchery and superintendent's cottage, and material ordered for new troughs, flooring, and an iron pipe line, to take the place of the old wooden flumes. The latter had been a menace for years, and permitted the escape through leakage in various ways of sufficient water to seriously curtail the output of the station. By the installation of this iron pipe line with laterals and small concrete dams at the various springs, shutting off the underflow, we expect to increase the water supply fully one third, which will permit of a substantial increase in the hatchery output as the demands justify.

The average number of cut-throat eggs taken from Taylor Creek for several years was about three million, our operations being limited to the capacity of the three stations—one and a quarter million to fill Tahoe Hatchery, a million for the Tallac Station, six hundred thousand to the Glen Alpine, and the remainder being distributed between Wawona, Sisson, and Ukiah hatcheries. For the season of 1910 the take was the largest ever made, being about 6,150,000 eggs—all taken from Taylor Creek.

This result furnishes an unanswerable argument to the criticism that is sometimes made, that the artificial propagation of fish is not a success. Eighteen years ago with a skillful force of men operating on sixteen creeks emptying into Lake Tahoe, from March 5th to August 15th, more than five months, the total take of eggs was 600,000, while in the present season operating on one creek only from March 27th to May 6th in less than six weeks our men collected upwards of six million eggs.

The Tahoe, Tallac and Glen Alpine hatcheries furnish all the cut-throat fry that can be distributed to advantage throughout the Tahoe and Truckee basins. In addition to Lake Tahoe, Independence, Donner and Webber lakes, a number of smaller ones on the western slope of the Sierras in the vicinity of Cisco receive their supply of cut-throat fry from this source.

All of the fish cultural operations in the Tahoe basin have been under the skillful supervision of Mr. E. W. Hunt, whose reports in brief will be found in the Appendix.

WAWONA HATCHERY.

Following the usual custom, this hatchery, which is located just within the confines of Yosemite National Park, has been successfully operated during the spring and early summer months for the past four seasons under the careful direction of Mr. M. L. Cross, one of our experienced and capable hatchery men. We have hatched and distributed from that station approximately 350,000 trout fry per year, the large majority of which were of the cut-throat variety, the eggs having been taken and shipped from Lake Tahoe. We have also shipped in rainbow eggs from Sisson, and Loch Leven fry, which were distributed in suitable waters.

In addition to the distribution made by Mr. Cross, in which he received the cordial support and assistance of Washburn Brothers, of Wawona, Major W. W. Forsyth, acting superintendent of the park, has borne an important part. A number of new lakes and inaccessible streams were stocked by United States soldiers, acting under his direction. He has also provided suitable conveyances to meet our fish distributing car at El Portal, and hauled the fish from that point into Yosemite Valley and from there distributed into lakes and streams rainbow, Eastern brook, and Loch Leven trout, sent in from the Sisson Hatchery.

That all this work has been intelligently performed is evidenced by the fact that practically all the lakes and small tributary streams are now teeming with fish, and it has been suggested by those most familiar with the conditions that our efforts in that direction be discontinued, and for the next two years be given solely to stocking Merced River and its larger tributaries.

In order to increase the present supply of trout in the main valley, Major Forsyth has prohibited fishing in its stream for one year—in the mean time stocking it heavily, with the hope of increasing its attractiveness by giving better fishing to the average angler, which result we believe will be accomplished when the present restrictions are lifted.

The Wawona Hatchery has also furnished fry sufficient to stock the head waters of the principal trout streams in Madera County, and also portions of Fresno County. This work was taken in hand by the Madera Sugar Pine Lumber Company, under the direction of Mr. Porter C. Thede, and Mr. W. B. Day of North Fork, and men of the United States Forest Service.

During the season of 1909 this station was visited by Commissioner Van Sicklen and Chief Deputy Vogelsang, to determine if it was feasible to change the source of water supply from the creek to the river. After giving the matter full consideration it was decided to build a new flume on the old site, and install a larger and more improved sand-box to take care of the débris, and orders were issued accordingly.

EEL RIVER SALMON AND STEELHEAD HATCHERY.

This valuable fish cultural station, located on Price Creek, one mile from its confluence with Eel River, in Humboldt County, continues to grow in importance every year, and fully justifies the forethought of our predecessors.

In our nineteenth biennial report we quoted extensively from the report made by the late W. A. Wilcox, statistician of the United States Bureau of Fisheries, Washington, D. C., showing by actual figures the remarkable increase in five years of the number of pounds of fresh salmon shipped from the port of Eureka following the establishment of this hatchery. The results are so apparent that practically all of the people of Humboldt County are now firm believers in the value of artificial propagation, and have, by petition presented through the federated commercial bodies of Humboldt County, requested that this hatchery be enlarged to double its present capacity.

A committee composed of representative men was appointed on October 19, 1909, to make a thorough investigation of the matter and submit a written report of its findings. This committee was named as follows: W. P. McIntyre, Fortuna, chairman; Theo. Van Duzer, Loleta; R. S. Fennaty, Ferndale; Brouse Brizard, Arcata.

A most interesting and intelligent report was made, submitting an estimate of the proposed improvements as $2,000.00. As to its reasons for asking this increase, we quote from the report:

> The amount of fish caught in Eel River and sold as an article of commerce for food supply was only about 300,000 pounds annually in 1899 and 1900, and of a value of less than $10,000.00 for either year. These amounts had been much surpassed in preceding years, but the stream had apparently been nearly fished out. But

beginning in 1901 (four years after the hatchery was established) the amount of fish caught increased very rapidly, so that for the five years 1903-7, inclusive, the annual average of shipments was over 3,000,000 pounds and the average annual value over $90,000.00. Much of this increase is attributed, both by sporting and commercial fishermen, to the gradually increasing effect of the hatchery output. And it is argued that an increase in the capacity of the hatchery will still further increase the supply of fish, and thus allow an additional number to be caught each year. And it is further desired to have some of the output placed in Mad River, so as to increase the supply in that stream, which is a small factor in the commercial production of fish, but a considerable one from the sportsman's standpoint.

Also, if the capacity of the plant be increased as requested, it would give an opportunity to handle more steelhead fry, which is greatly desired by the sportsmen fishermen. And on occasion, if the eggs could be procured, it would be very desirable to hatch out trout to replenish the smaller fishing streams of Humboldt County now pretty badly fished out.

For these reasons, and because of the comparatively small cost of the proposed increase in size of plant, we trust your Commission will give this matter your prompt and favorable consideration.

Respectfully,

[Signed.] W. P. McIntyre, Chairman,
For the Committee on Increase of Hatchery.

In our opinion this request should be met on this showing, which is further confirmed by the report of the Eureka Harbor Commission.

As a salmon hatching and distributing station it has no superior, being situated less than 20 miles from salt water, which removes to a great extent the dangers to which young fry are exposed in the passage through fresh water to their natural home, the sea. On the other hand, we do not consider the station so well located for the capture of steelhead in spawning condition, as the main runs of the fishes when passing the mouth of Price Creek are yet too green to be spawned. This has been clearly demonstrated by our experience in former years, when our men captured hundreds in Eel River by means of seines; attempts were also made to hold fish in live-cars taken 25 miles farther up the river, but the results did not justify the expense.

During the season of 1910 a shipment of steelhead eggs, 200,000 in number, taken at the dam of the Snow Mountain Power Company on the South Fork of Eel River in Mendocino County about 100 miles inland, was made to this station via Ukiah, thence by rail to San Francisco, carried by steamer to Eureka, and again shipped by rail to Alton. These eggs arrived in good condition, all things considered. (Note report of Superintendent Fassett.)

By continuing the egg-collecting station on the Snow Mountain Power Company's dam, which possesses unusual advantages for taking a large number of steelhead eggs, we could add greatly to the output of the Eel River Hatchery. Another opportunity to contribute is presented by the fine station on Scott Creek, in Santa Cruz County, which is improving yearly. When the railway now building northward from Sherwood towards Eureka is completed, it will be comparatively an easy matter to ship in 1,000,000 eyed steelhead eggs from the Snow Mountain stations, which may also furnish a supply of salmon eggs.

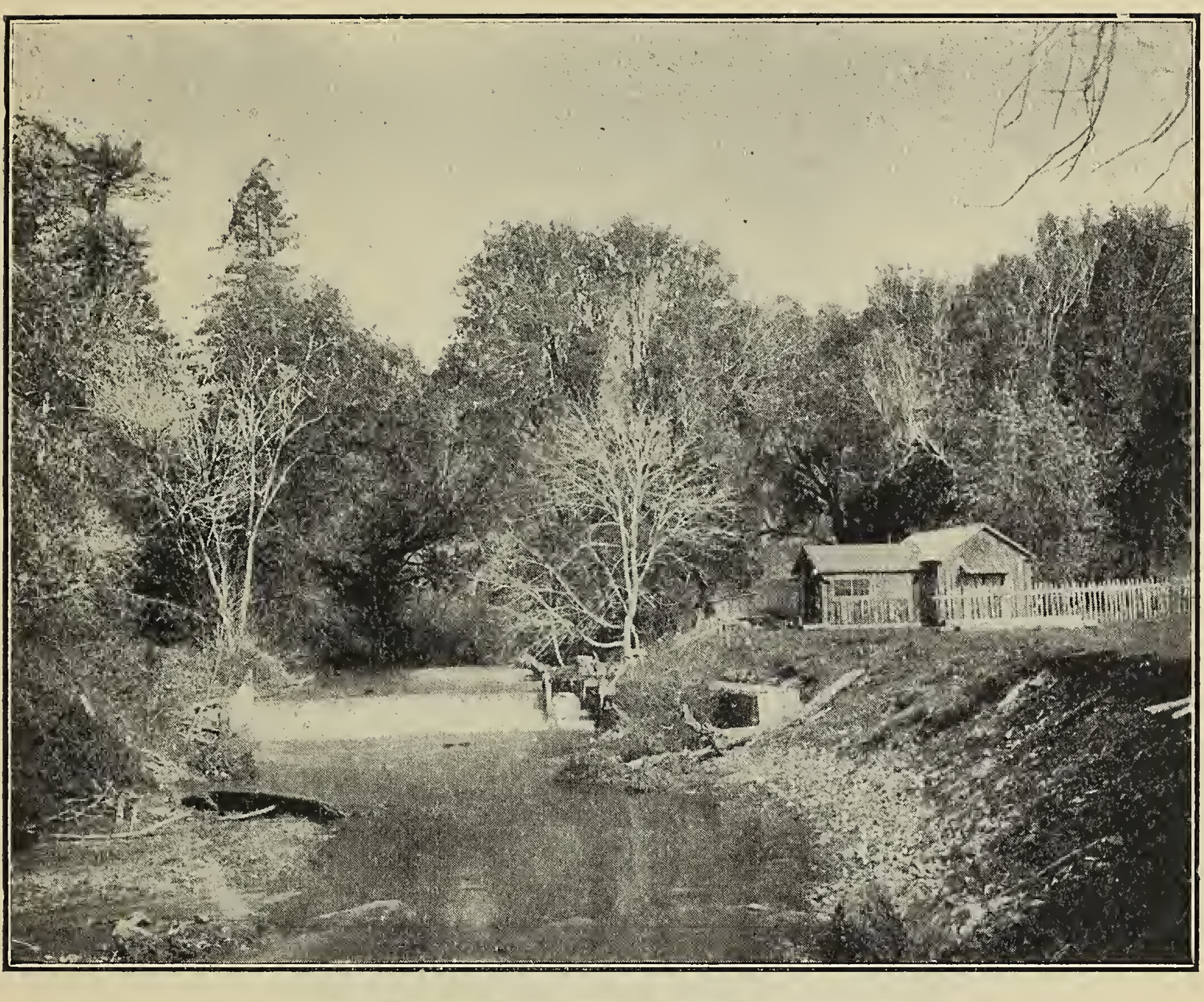
For these reasons we are heartily in favor of enlarging and improving the Eel River Hatchery.

Much credit is due the superintendent, Mr. W. O. Fassett, who with a small force has not only kept his station in an excellent state of repair, but made many improvements. He has also handled the important fish cultural work intrusted to him with marked success. His reports on both salmon and steelhead work for the past two years will be found in the Appendix.

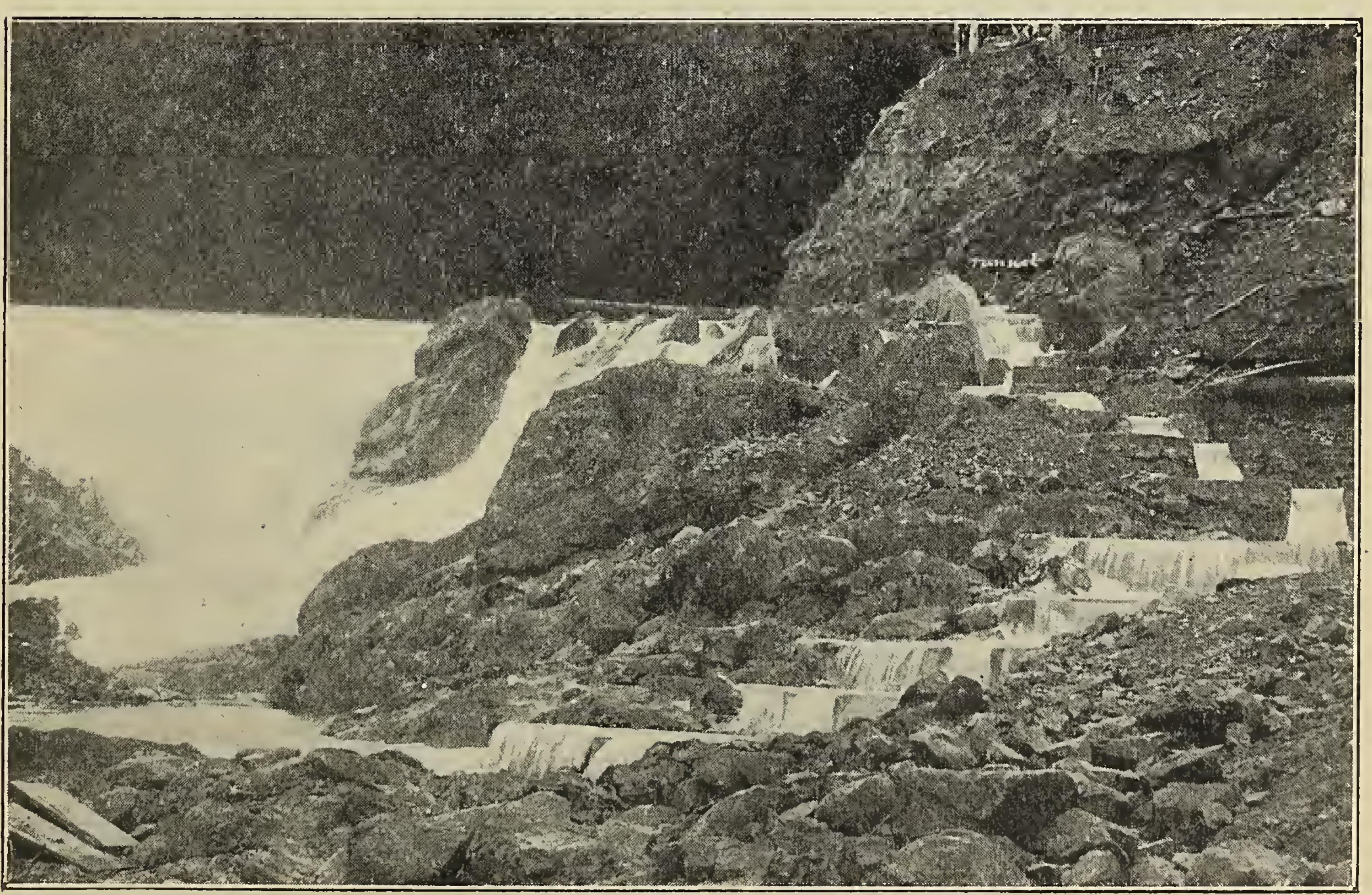
SCOTT CREEK STATION.

This important steelhead egg-collecting station is located on the creek of the same name in Santa Cruz County, at Swanton. It was first established by Mr. Frank A. Shebley, the efficient Superintendent of the Brookdale Hatchery. Scott Creek is one of several streams in the county where a considerable number of steelhead eggs can be collected at comparatively small expense. This one possessing some advantages over the others, Mr. Shebley, with the approval of the county board of supervisors, built a concrete dam across this creek, with a fishway and trap connected, through which the fish would be diverted into a retaining pond, in which they are held until ready for spawning.

Two years ago a request was made of this Board to assume a part of the expense of operating the Brookdale Hatchery, in return for which a sufficient number of eggs or fry were to be furnished for distribution into neighboring counties, San Mateo, Santa Clara, and Monterey. After due consideration of the matter, and investigating the possibilities, an agreement was entered into between this Board and the supervisors of Santa Cruz County, wherein such privileges on Scott Creek as had been acquired by the supervisors were made over to the State, which in turn should assume all expense of its operation and improvements. In order to avoid the expense of operating on several streams and yet collect all the steelhead eggs we would require, a five-year lease was made for a strip of land 200 feet in width, being 100 feet on each side of the middle line of creek where the stream passes through the land owned in common by A. Gianone, William Purdy, Kate Purdy, and Amy Arano, for a fixed consideration per year, depending upon the amount of the holdings. With the Ocean Shore Railway and the Shore Line Investment Company, who were the principal owners of the lands abutting the stream, a yearly lease was made through Mr. J. Downey Harvey, president of these companies and a former member of this Board. Notices were then posted closing the stream to all fishing for a distance of about six miles from its mouth. The concrete dam was enlarged and strengthened, a new trap put in position last year, and this year $500.00 was appropriated for additional improvement in the shape of a concrete retaining pond.



Scott Creek Spawning Station, Santa Cruz County.



Snow Mountain Power Company Dam and Fishery, South Fork of Eel River.

The collections for this season were 2,182,000 steelhead eggs, of which 320,000 were sent to Sisson, the fry from which are used to stock coastwise streams in Santa Barbara, San Luis Obispo, and Ventura counties; about 200,000 were sent to the Marin County Hatchery, and 100,000 shipped to the United States Bureau of Fisheries Station at Oregon City, Oregon; the remainder, except 200,000 hatched at Spawning Station and returned to Scott Creek, were hatched in the Brookdale Hatchery, which, together with the salmon eggs collected, made a grand total of 3,582,000 eggs of all kinds. Three fourths of the fry were distributed in the waters of Santa Cruz County; the balance were distributed between the counties of San Mateo, Santa Clara, and Monterey. The proportion of the total operating expenses borne by the State approximates two thirds, which is paid out of the fish and game preservation fund.

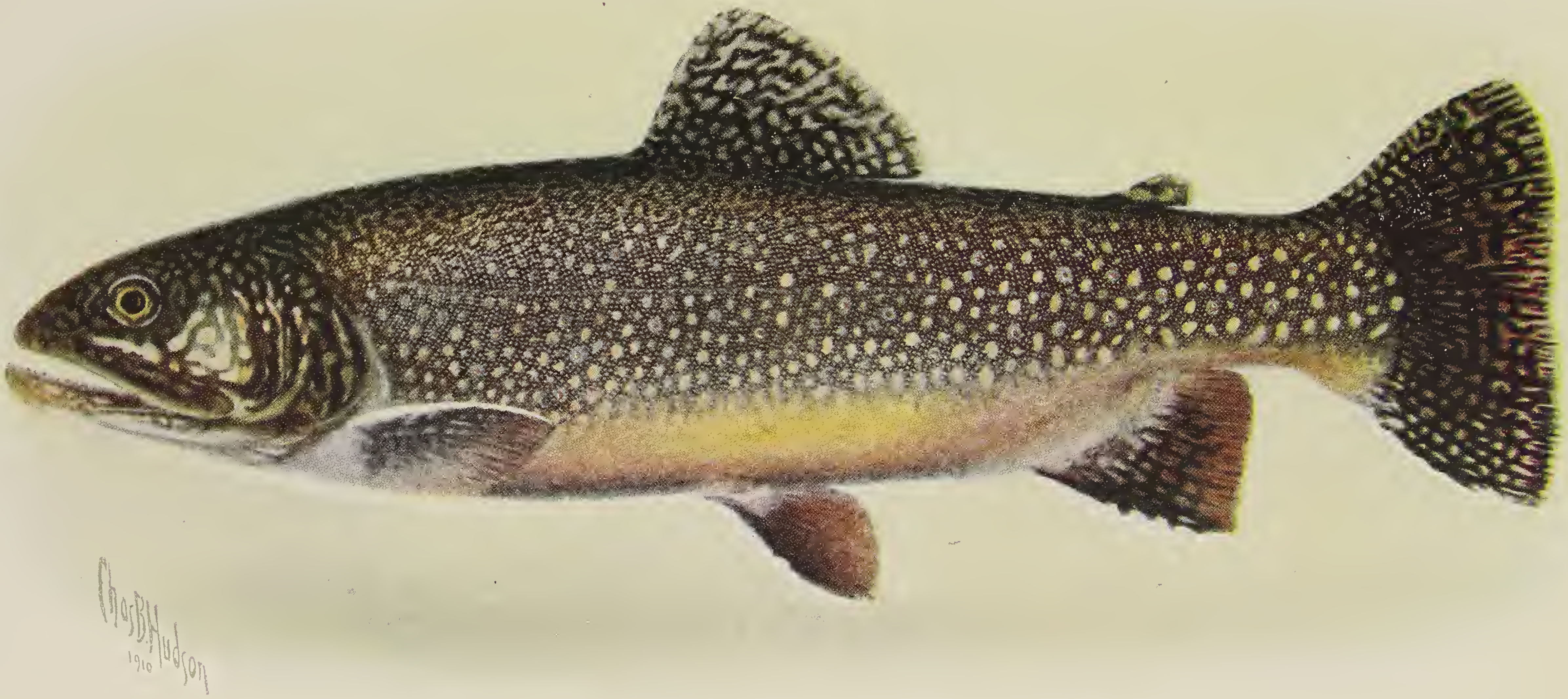
We beg to express our appreciation of the never-failing courtesy of the county board of supervisors, especially of Mr. Ralph S. Miller, who acted as a committee of one on matters pertaining to the hatchery; and in all matters pertaining to the advancement of the fish and game interests we have had the cordial coöperation of Mr. Miller.

Mr. Shebley has carried on successfully some very interesting work in the line of hybridization, and succeeded in establishing a cross between the female steelhead trout of the coast streams and the male Lake Tahoe trout—a fish that we believe will prove of inestimable value to the waters of Lake Tahoe, Independence, Webber, and Donner lakes, as this cross seems to produce a fish retaining all the fine food qualities of the trout of the mountain lakes, combined with the well known gamy qualities of the steelhead.

Some important scientific work has been carried on for the past two years by Dr. C. H. Gilbert of Stanford University in the interest of the United States Bureau of Fisheries, in which he was assisted by our Mr. C. A. Reed.

EASTERN BROOK TROUT.

As will be seen by comparison with the reports of 1900 only 6,000 fry of this variety were turned out by our hatcheries in that year. The output for the past three years has been in excess of one million per year. These fish have shown remarkable adaptability to small lakes and meadow streams of the high Sierras. In order to satisfy the demands we have made some plants in considerable numbers in Coast Range streams, but no appreciable results have been manifest; on the other hand, at all elevations above three thousand feet and up to eight and nine thousand splendid results have followed, which the people in the mountains are not slow to realize; consequently there is an increasing demand, and as new lines of transportation have enabled us to reach



EASTERN BROOK TROUT (*Salvelinus fontinalis*)

DRAWN FROM MALE FISH 13 INCHES LONG

heretofore inaccessible sections, we believe every effort should be put forth to meet it. This beautiful fish finds a congenial habitat in waters where neither the rainbow, cut-throat nor Loch Leven trout will remain. The cut-throat prefers the calm waters of a lake altogether, while the rainbow is essentially a fish of the swift-running streams of large volume. Both the Eastern brook and Loch Leven possess a decided advantage over our native fishes with reference to their breeding habits. They mature one year earlier, and are known as "fall spawners"; that is, they seek the spawning beds the latter part of October and November. That being a time when the summer tourists and stockmen have left the mountains, they can perform that function of nature unmolested, consequently we believe through natural propagation a larger percentage of eggs are fertilized and hatched than of the native fishes. During the past two years, in addition to renewing the plants made in previous years in sections where the fishing had been heavy, substantial plants have been put into barren waters beginning at a point as far south as the Giant Forest region in eastern Tulare County and extending northward to Siskiyou County.

Through an exchange for the eggs of cut-throat trout, we were able to procure 5,000 of these fish ranging from four to eight inches in length, from Messrs. Morrill and Denton, at Verdi, Nevada, of which number about one half were sent to our Sisson Hatchery to cross with our pond fish, with the view of bringing together unrelated stock and overcoming the effects of interbreeding. The remainder were planted in Donner Lake, a magnificent body of water, but with no well defined inlet that could afford a spawning ground for cut-throat or rainbow trout, but which has weedy shoals and sandy beaches suitable for the Eastern brook. We hope to make this one of the banner lakes of the Sierras for these fishes.

We have also been able to stock liberally suitable waters with both Eastern brook and Lock Leven trout in Inyo County, a region heretofore neglected through lack of transportation facilities. Our fish distributing car has made two trips in the past two years to that section of our State, carrying in a liberal supply of rainbow, Eastern brook, Lock Leven trout, and also substantial plants of black bass. We have found Inyo County has waters specially adapted to all these varieties, besides it is rich in game, and will undoubtedly soon be known as a "Sportsman's Paradise," which title it already deserves. The people generally are most appreciative of our efforts and have shown unbounded hospitality to our representatives. Public sentiment being so strongly developed in favor of fish and game preservation, we have sent in a liberal supply of pheasants and Hungarian partridges, that were distributed in different sections of the county and from which excellent reports have come, showing a substantial increase in the wild state, which indicates the adaptability of these rare game birds to that section. The fish and game interests of the county have been carefully and intelligently cared for by our deputy, Mr. E. H. Ober, and his efforts ably seconded by Sheriff Naylor, the board of supervisors of the county, and the Owens Valley Chamber of Commerce.

LARGE-MOUTH BLACK BASS.

Considerable space was devoted to the importance of these delicious food and game fish in our nineteenth biennial report. We quoted the opinion of some of the oldest fishermen on the Sacramento and San Joaquin rivers to the effect that in a few years these fish would be as plentiful as carp. While we anticipated a substantial increase, we hardly expected such wonderful results as have been accomplished.

We believe that California to-day is one of the best stocked states in the Union. The rivers, streams, and sloughs throughout the Sacramento and San Joaquin valleys are teeming with them. There is scarcely a suitable reservoir or lake below the range of trout in which a fine day's sport can not be had. Lakes and sloughs tributary to Owens River in Inyo County have received substantial plants during the past two years, and a gratifying increase has been noted. Their range in this State is practically unlimited, so far as a northern or southern latitude is concerned. Their introduction into Clear Lake, Lake County, a number of years ago has proven to be a decided success. While they could be seen in considerable schools it has only been in the past three or four years that a sufficient number could be caught to make the sport worth while. The explanation for this would seem to lie in the fact that there was such an abundance of food supply in the shape of small native fishes and young carp that the ordinary angler's lure would not attract them. In the past two years experienced anglers who have fished in nearly every state in the Union report to our office that the black bass fishing in Clear Lake exceeded anything in their experience.

As an exchange of international courtesy, a car load of these fish was captured in Fresno and Kings counties by Deputy A. D. Ferguson, assisted by Deputies Ellis and Smalley. These fish were taken in the latter part of December, 1909, and transported in our fish distributing car to two points in the Republic of Mexico. There were 1,800 adult fish in the shipment; three fourths of them were planted under the direction of Governor Ahumada, in Lake Chapala, a body of water 60 miles in length with an average width of 10 miles, in the State of Jalisco. The remainder were planted in a small lake designated by Governor Landa of the district of Mexico, near the city of Mexico. The first liberation of the fish did not occur until the tenth day after their capture, and yet so skillfully were the fish taken and handled en route there was a loss of but two fishes, and these lost their lives by jumping out of the cans while in transit.

This tender to the Mexican Government was made in exchange for the wild turkeys that we have procured from that country, and which are now flourishing at the State Game Farm. Every courtesy and extreme hospitality was shown to Mr. Requa, in charge of the car, and his four assistants by the Mexican officials.

Another long distance shipment of more than ordinary interest was made at the request of the United States Bureau of Fisheries at Washington, D. C., when 140 large-mouth black bass, ranging from 5 to 8 inches long, were sent to the Philippine Islands. The fish were taken with hook and line by Deputy M. L. Cross from the Daly reservoir near Folsom, Sacramento County, and delivered to Alvin Seale, representing the Washington authorities, on board the United States army transport *Sherman*. Careful preparation had been made, a circulating pump arranged to keep the fish supplied with fresh water at all stages of the long journey, and ice supplied when necessary. Thirty-four days were occupied in making the trip, during which time but 22 fish were lost; the remaining 118 were planted in good condition in a lake of considerable size, which in the judgment of Mr. Seale is well adapted to their requirements. Our State, in addition to furnishing out of its abundance a new and valuable fish to the Philippine Islands, has also given to New Zealand the quinnat salmon and rainbow trout.

During the past three years many black bass, also striped bass, have been rescued from overflowed islands in the San Joaquin delta and in the vicinity of Sacramento. In the San Joaquin district thousands of these fine food fishes were taken either by our own men or by trustworthy fishermen acting under written permission and returned to living waters. In return for the work which involved damage to nets and gear, as well as time, the fishermen were allowed to retain all striped bass weighing 3 pounds and upward, all under 3 pounds and all black bass being placed alive in waters connecting with the main river. The black bass taken around Sacramento were captured by Deputy George Neale, and enough retained to fill applications throughout the State, the remainder being placed in small lakes and other suitable bodies of water in Sacramento County. In the Fresno-Kings section of the San Joaquin Valley, where black bass were first planted in 1895 and 1897, they have shown remarkable increase. Some conception of the numbers to be found in that region may be formed when it is shown that this Commission, through its branch office at Fresno in 1909, took out and returned to living waters some half million live bass of all sizes, mostly small, which had been stranded or cut off from the main rivers by receding floodwaters. Experienced and careful observers report a remarkable decrease in the numbers of carp, proportionate with the increase of black bass, to which voracious fish the young carp fell easy prey.

Requests have been made by market fishermen and some of the dealers asking that the law be amended to permit of the capture of black bass with nets or seines. In our opinion such legislation would be most unwise. Black bass travel in schools, and it would be possible to wipe out the entire supply in any given body of water if such operations were made legal. Besides, so long as the present restrictions exist permitting them to be taken with hook and line only, a far larger number of our people, especially those living in the country, derive food, profit, and pleasure by capturing them in accordance with the existing law. We would, therefore, recommend that no change be made.

SHAD.

This valuable food fish continues to be found in great abundance throughout the Sacramento and San Joaquin basins, and the principal streams tributary to these rivers, also in Suisun, San Pablo, and San Francisco bays. No necessity has yet arisen for any restrictions as to their capture, except the one referring to size of mesh with which they can be lawfully taken. This restriction, however, was not intended to apply to shad, except in a limited degree, but is intended for the protection of the striped bass and salmon. Without it, market fishermen could with perfect impunity operate during the close season on the plea that they were trying to catch shad, and accidentally caught salmon or striped bass during the prohibited time or with unlawful seines. This in itself would not be serious were it not that the average market fisherman never releases anything that comes into his net, and would take a chance upon finding some way to smuggle it into the market. It is a remarkable fact that while the shad is considered the most valuable river fish of the Eastern States, our people have yet failed to appreciate its good qualities. There is no question as to the quality of the fish, which when properly handled is equal to the best taken anywhere in the world. The principal cause for complaint is because ''it is so bony.'' During the past two years we have seen large catches aggregating 800 pounds made by two fishermen on a single drift, which contained specimens weighing ten pounds, but owing chiefly to the limited demand the price paid to the fishermen ranged only from one half a cent for males to two and one half cents per pound for the females, the additional price being added for the ''shad roe.'' In our nineteenth biennial report we suggested that in order to create a better market for shad, the exportation of striped bass from the State be prohibited. Such a law, we believe, would result in exporting thousands of pounds of shad into Nevada, Utah, Colorado, and Arizona, that are now taking our striped bass, and tend to reduce the constantly rising price paid by our own people in this State. We again earnestly recommend that this matter be brought to the attention of the legislature at the forthcoming session.

A brief history of the shad, we believe, is worthy of repetition. The first plant aggregating 50,000 fry was brought from the state of New York from the state hatching works on the Hudson River at Castleton by Seth Green, recognized as one of the pioneer fish culturists of this country. They were planted in the Sacramento River at Tehama on June 27, 1871, which was followed by other plants in 1873, and the last one in 1881. A bonus of $50.00 was offered for the first shad to be taken in the waters of our State, and that was paid in 1873. In 1874 sixteen full grown fish were taken at Vallejo. Since that time they have become so firmly established and are in such abundance that we believe that the declining shad industry of the Eastern States can be renewed and replenished by obtaining a supply of shad eggs or fry from California.

CATFISH.

The catfish is another important food fish that has shown remarkable development in this State. The first plants introduced here came from the Schuylkill River, Pa., and from the Missouri River at Omaha, Nebr. This gave us two varieties of catfish. Both were planted in the San Joaquin River near Lathrop. They have been transplanted into other sections of the State until there is scarcely a stream or slough in the Sacramento or San Joaquin valley that does not contain them in great abundance. The sale for them, however, in the San Francisco markets is somewhat limited, and they are purchased principally by the Chinese. On account of their excellent food and shipping qualities, tons of them are sent out of the State every week, principally from Sacramento, from which point they are shipped south to Arizona, northward to Oregon, and eastward as far as Kansas City. Previous to the last session of the legislature there had been no restrictions upon their capture, but owing to the increasing markets outside of California and the excellent price this drain was greater than the natural increase would warrant, and the fishermen began to take the smaller ones by reducing the size of the mesh of their fyke nets, by which they are principally caught. At the request of the principal fish dealers of Sacramento, a recommendation was made that the minimum size at which catfish could be sold was eight inches, applying to dressed catfish. This became the law, and with a slight amendment in its phraseology will, in our opinion, be all the restrictions required. Market fishermen operating around Bouldin Island in the San Joaquin River claim that through the workings of this law it has reduced the sales from one half to three fourths, but while this law creates a temporary hardship among those who follow that mode of fishing for a living, it will in a couple of years, in our opinion, regulate itself.

STURGEON.

For about ten years an absolutely close season has existed against the taking or possession of fresh sturgeon. This law was passed with the hope that these fish would show an increase. The results have not been encouraging. Various theories are advanced, the principal one being that in the waters in which sturgeon were once in great abundance, striped bass and black bass—two types of voracious fishes—are now found, and it is believed they feed largely upon young sturgeon or sturgeon eggs. In certain sections of the Sacramento and San Joaquin rivers large specimens are still found. They are a menace to the fishermen's nets, frequently becoming entangled in them and creating considerable havoc, with the result that every sturgeon caught in a net was killed, and the bodies of these large fish were found along the rivers. In order to prevent this needless waste of a very excellent food supply, a law was enacted at the thirty-eighth session of the legislature making it an offense to kill or have in possession any sturgeon weighing less than 25 pounds. Fish under that size can pass through the salmon nets and need not be taken or destroyed. It gave an opportunity, however, for the fishermen to capture and sell any sturgeon weighing 25 pounds or more. As specimens weighing over 100 pounds are frequently taken, we believe that some good is being served and no real injury inflicted upon the sturgeon supply of this State.

ABALONES.

During the past three legislative sessions various changes have been made with respect to the taking and possession of abalones and abalone shells, referring also to size and method of capture. The existing law prohibits the taking of the black and green abalone of any size at any time, but permits the abalone known to commerce as the red abalone (*Haliotis rufescens*) measuring not less than seventeen inches around the outer edge of the shell to be taken at any time. The red abalone has a distinct food value, the broth being especially valuable in the sick room. Under this law one or more abalone canneries are operated, and the product is sold largely throughout the United States. On the other hand, the shell of this variety has but little commercial value, whereas the shell of the black and green abalone has a very considerable value, being used in the manufacture of abalone jewelry, for which there is a large and constantly increasing demand. When this law went into effect there was in the possession of dealers and manufacturers a large stock of black and green abalones that had been legally taken and was not worked up. Under a liberal construction of the law, jewelers and other manufacturing establishments were permitted to work up the old stock, which is now practically exhausted. Unless some amendment is made to the present law it will result in putting out of business a number of manufacturing establishments employing white labor in this State.

The real purpose of the law was aimed at the aliens, Japanese and Chinese principally, who were taking them by the ton without regard to size by the aid of diving suits, removing the meat from the shell in the water, bringing it ashore, where it was dried and shipped either to China or Japan. We believe the use of diving suits should be permitted, as there are apparently inexhaustible beds of red abalones along our southern coast, which can not be profitably taken in any other way, and the law should be amended so that both black and green abalones can be taken and possessed at any time, the former not to measure less than twelve and the latter less than seventeen inches around the outer edge of the shell, but prohibiting absolutely the shipping of dried abalones or unmanufactured shells out of the State. Such a law would not only permit the canneries to operate, put up their catch and dispose of it, but would furnish a sufficient stock of shells of all kinds for use of local manufacturing establishments, whose combined demands would not be one twentieth part of that made in shipping dried abalones and shells out of the State. Legislation along these lines would be fair, just, and, we believe, produce the desired effect.

CRAWFISH, OR SPINY LOBSTER.

In our nineteenth biennial report and again in our preliminary report of 1907–08 we recommended that a close season of two years be established on this, one of our most important shellfish, which began to show signs of possible extermination. The matter was presented to the legislature, and after much discussion a law was enacted establishing an indefinite close season, but permitting crawfish measuring not less than nine and a half inches, but taken without the waters of this State, to be sold in our markets under restrictions which were to be prescribed by the Board of Fish Commissioners, and provided further that the expense of such inspection and marking ''shall be borne by the person or persons importing such lobster, or crawfish.'' It was represented to the legislature that crawfish were to be found in great abundance in Mexican waters, and a company had been organized to propagate them extensively on the coast of Lower California. This law has worked satisfactorily. The only port of entry for Mexican crawfish is San Diego, where a representative of the Fish Commissioners meets every incoming shipment, and checks up and marks each individual specimen. This plies the markets of Los Angeles and other southern cities and permits a considerable number to be sold in San Francisco. We believe this law should remain in force at least two years longer, by which time there should be a sufficient increase to permit of their being again taken under certain restrictions yet to be determined upon in our waters.

CRABS.

In our preliminary report submitted during the thirty-eighth session of the legislature we recommended a change in the law relating to the seasons for taking of crabs, opening the months of September and October, and establishing in lieu thereof a close season of four months extending from the first of November to the first of March of the following year, which recommendation was favorably considered by the legislature and enacted into a law. While this law has some advantage over the other, we are firmly of the opinion that sufficient protection is not yet accorded to this, one of the most delicious crustaceans to be found in any part of the world. We find that through extensive fishing the large crabs have been practically exterminated on the principal fishing grounds, and believe that the surest way to restore the supply would be by establishing a close season of two years. In point of numbers the supply does not seem less, but three fourths of the crabs found in the markets do not average over six or seven inches across the back, and it requires at least three to furnish the same amount of crab meat as is produced from an eight or nine-inch crab. An absolute prohibition against their catching for a term of two years would enable small crabs to attain a respectable growth. If it is not deemed advisable to establish a close season for that length of time, we would urge that their capture be prohibited for at least six months of every year, beginning with the first of October and ending on the first of April, and at the same time raising the minimum size from six inches to not less than seven and a half. This would, however, have the effect of making the price of crabs almost prohibitive, which in turn would be an inducement for the alien fishermen to smuggle in the smaller ones and dispose of only the "crab meat." Such a law would be difficult of enforcement, as it would be almost impossible to get conclusive evidence as to size or sex, and would also encourage the capture of the female crab. The better way in our opinion to bring about the desired result, with fairness to all, would be in the establishment of a two years' close season.

THE SHRIMP LAW.

To take shrimp without taking and destroying an unreasonable number of small fish continues a difficult problem, as shown by the list of arrests and fines. The Chinese fishermen have been fined for violations of the shrimp law during the past two years the sum of $4,325.00, this being the largest amount for violation of any section of the Penal

Code relating either to fish or game; notwithstanding which their harmful methods of taking shrimp show little or no improvement. At the last session of the legislature a close season of three months—June, July, and August—was established, with the hope that this interruption in the work would close up the camps and cause the experienced crews to leave for other employment, so that when the season opened again there would be difficulty in getting trained hands.

We had confidently believed that the law prohibiting the exportation of dried shrimp and shrimp shells out of the State would be a restriction sufficient to put out of business practically all of the boats, except those engaged in the capture of shrimps for consumption in the fresh state, and that number of boats, 5 or 6, could not affect seriously either the supply of shrimps or young fish and could easily furnish all the fresh shrimp that can be consumed in this State. After observing carefully the workings of the present law, we are convinced that a better and more positive way to stop this drain on the fish resources of San Francisco Bay can be accomplished either by establishing an indefinitely close season, or by making it an offense for any person to take or have in his possession more than 5 pounds of dried shrimp or shrimp shells taken in the waters of this State. In our opinion, the latter suggestion would be perfectly feasible and produce the desired relief, even to the point of permitting their capture the entire year.

There is no scarcity of shrimp in our waters. They are in great demand by hotels, restaurants, and for private consumption. To limit the possession of dried shrimp to 5 pounds would at once put an end to the extensive drying operations whereby tons of shrimp are handled daily, and which are intended primarily for export. In spite of the fact that tons of Mexican shrimp or prawns are cleared through our office under permit, we find that California shrimp and shrimp shells have been sent to China and other countries labeled "dried fish," "seaweed," "fertilizer," "coffee," or "beans," and not shipped in sacks, but in tightly nailed boxes or barrels.

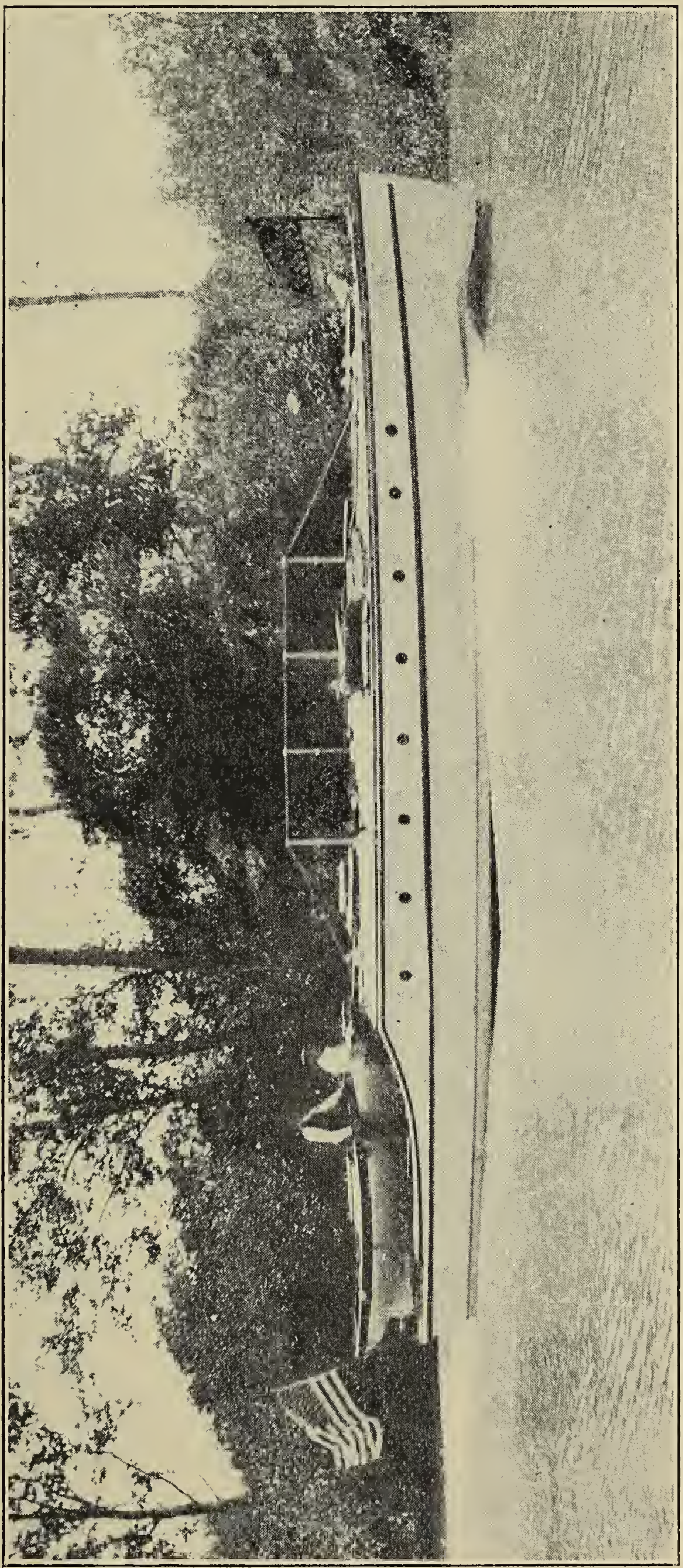
Important seizures have been made, and in some cases substantial fines imposed, but not, in our opinion, commensurate with the gravity of the offense, the result being that the exportation continues in one form or another, indicating there is much profit in the shrimp business, which is carried on exclusively by the Chinese. The dried shrimp are not used by whites, and only a small fraction of the total amount produced is sufficient to meet the demands of the Chinese and Japanese residing in this State. Therefore, our citizens would not be at all disturbed should the drying of shrimp be prohibited altogether and fresh shrimp permitted to be handled as at present.

Undoubtedly some small fish will be taken so long as the use of bag nets is permitted. Should the law be amended prohibiting their use for the taking of shrimp as well as of fish, it would result in finding some other and less destructive method of effecting their capture. This would indicate that it may not be a necessity to prohibit the catching of shrimp. We are, therefore, of the opinion that if the possession of more than 5 pounds of either dried shrimp or shrimp shells be made an offense punishable by a fine of not less than $100.00, trial jurisdiction to be in the Superior Court, the damage to the fishing interests of our bays will be reduced to the minimum without depriving the markets and the people generally of a choice crustacean, which is peculiarly a California delicacy. The suggested changes will be met by strong opposition, as the Chinese are always represented at the legislature by agents or paid attorneys.

NEW PATROL BOAT.

The patrol boat Quinnat, which had been in service for fourteen years, has been replaced by a larger, faster boat of more modern type. The old boat which was 40 feet over all, 7½ feet beam, and equipped was a 22 horsepower "heavy duty" engine, had a draft of 4 feet, which frequently proved a disadvantage when in pursuit of violators, who could escape by running into shallow water with their boats of light draft. The Quinnat had rendered excellent service and was unquestionably for years the best gasoline boat to be found in these waters, with sufficient speed to overhaul any of the fishing boats, but few of which were power boats. At the present time about 30 per cent of them are equipped with gasoline engines.

The method of collecting and shipping the catch of commercial fishes has also materially changed. Formerly the fishermen operating in the rivers delivered their fish at some steamboat landing from where it found its way to the markets through regular transportation channels. To-day all the large fish dealers have fast power boats in which their agents hover around the fishing grounds and buy the fish direct from the fishermen as soon as they are taken from the nets. When a load has been obtained, these boats come directly to San Francisco. It therefore was a necessity to have a boat fast enough to overhaul any other boat in the fishing business. We gave careful consideration to the question of installing a more powerful engine in the old hull, but as that would increase the already excessive draft, and believing that the model could be improved, it was decided to build an entirely new boat on different lines with more speed. In the past few years there has been developed what is known as the cruiser of the raised-deck type, a boat capable of going to sea in almost any weather, and is the successful type used for long trips on the Atlantic between New York and Bermuda Islands, a distance of about 600 miles. From the originators of this model, Whittlesey & Whittlesey, marine architects of New York, we procured the plans and specifications, which were submitted to four well known boat-builders of San Francisco and vicinity—John Twigg & Sons, W. S. Brusstar & Sons, H. Anderson, and Wm. Cryer. Twigg & Sons



New Patrol Boat "Quinnat."

being the lowest bidders, the contract was awarded to them for the construction of a hull to be 46 feet in length, with a beam of 8 feet 9 inches, draft 38 inches, which was 10 inches less than the old boat. Four sleeping berths, a complete galley, a 12-foot tender, and a lavatory were also included in the contract. Later the tender was equipped with a 2 horsepower gasoline engine. The name Quinnat was transferred to the new boat, which was successfully launched on June 5th, and went into commission shortly thereafter. Under favorable conditions the boat will develop a speed of 13 miles per hour, which is furnished by a 40 horsepower engine. The construction of the boat is solid and substantial in all particulars. The interior trimmings are of Philippine mahogany, a wood which is particularly adapted to this climate. It is equipped with electric lights throughout, and carries also a powerful searchlight, which is of great advantage for night work. An entirely new and successful feature of the boat is its controlling device, the invention of a San Francisco concern—Binns & Pagendarm—which enables one man from the cockpit to have complete control of the steering apparatus, the engine, and the searchlight.

Special provision was made for three large fuel tanks, which were located under seats in the cockpit, and carry 240 gallons of gasoline. This gives her a wide cruising radius, and will permit trips being made as far as Monterey Bay, and also to watch the crab fishermen and larger fishing boats which operate outside the heads in the Pacific Ocean. The total cost of the boat and its equipment was $6,500.00, which was met by the sale of commercial fisherman's licenses.

We have also acquired by purchase a fast light draft boat, 25 feet in length, equipped with a 12 horsepower engine, for use in the shallow sloughs around Sacramento to look after market hunters and fishermen. This boat is in charge of Deputy George Neale, with headquarters at Sacramento, from which point it operates northward and to points down the river as far as Rio Vista, paying special attention to the striped bass and black bass breeding grounds, which are embraced in Cache Slough and its tributaries, Lindsey, Prospect, and Miner sloughs. We have also procured from the Gorham Engineering Company of Alameda, in exchange for the old Quinnat, an entirely new 26-foot power launch built on the salmon boat pattern, which can operate in all kinds of weather and has proven to be a valuable auxiliary. Resembling so closely the regular fishing boats, she is able to do not only considerable detective work around the shrimp camps without being observed, but among the market fishermen. She can also be used to good advantage in the shallow sloughs tributary to the San Joaquin River, in the vicinity of Stockton, where shad, black bass, striped bass, and catfish are found in large numbers, and will prove a valuable adjunct to the striped bass hatchery work. These boats, with their complete equipment, have been paid for out of our own funds without asking for a dollar of appropriation.

NEW FOOD AND GAME FISHES.

Through the courtesy of Hon. Geo. M. Bowers, Commissioner of the United States Bureau of Fisheries, there was received in the month of November, 1908, a car load of fresh water fishes adapted to the smaller bodies of water at low elevations.

The car was loaded at the United States Fishery station at Meredosia, Ill., with the crappie (*Pomoxis annularis*), the blue-gilled sunfish (*Bepomis pallidus*) and the yellow perch, commonly known as ring perch (*Perca flaverscens*).

The crappie is one of the most popular of the fresh water fishes found in the markets of Washington, St. Louis, Chicago, and Baltimore. It does not range far north, but is held in high esteem in the Southern States, where it is a great favorite among the anglers. It will take a minnow bait as promptly as will a black bass, but does not make so much of a fight, although it requires considerable skill on the part of an angler to ''land him.'' He is a most excellent pan fish, sometimes reaches the length of about a foot, a prolific breeder, and it is believed will find a congenial habitat in the small lakes and ponds at low elevations in this State. It is frequently called ''calico bass,'' and there is but little difference between them, except that the calico bass is found in more northerly waters.

The blue-gilled sunfish is the best known and most important of all true sunfishes. It is commonly called ''bream,'' and is found in the Great Lakes and throughout the Mississippi Valley. Though sometimes found in quiet streams, it is the sunfish of the lakes. It reaches a length of from twelve to fourteen inches, and maximum weight of a pound and a half. As a pan fish it is excelled only by the yellow perch, the flesh being firm and of a delicious flavor. It is an excellent fish for the angler, and can be taken with almost any kind of bait, or by trolling.

Of the perch family, the yellow perch is most highly esteemed for its fine food qualities. It is not a great fighter for the angler, although it bites well. Its usual length is twelve to fourteen inches, ranging in weight from a half to two pounds, but examples weighing 4½ pounds have been taken. He is essentially a lake fish, but flourishes in large, fresh water sloughs and deep lagoons.

It was believed by the Fish Commissioners that more attention should be given to stocking the smaller reservoirs and ponds and lakes at low altitudes with a pan fish that would afford not only some sport in its capture, but also furnish a food supply.

The fish reached us in good condition, and we had experienced deputies stationed at the different points where the fish were to be delivered so as to insure that they would be handled and planted by competent men.

The first shipment was delivered to E. W. Hunt, at Reno, who carried four cans of the crappie and sunfish to Honey Lake, in Lassen County.

The next shipment, yellow perch and crappie, was planted in Vera Lake, Nevada County, by Deputy Roy Sullaway.

Deputies Geo. Neale and M. L. Cross received allotments of bream, sunfish and yellow perch at Sacramento, which were planted in Plumas Lake, Placer County, and in sloughs of Feather River, near Marysville; also Washington Lake and Brushy Lake, in Sacramento County.

Deputy Roy B. Heacock landed a shipment of the three varieties in suitable waters around Stockton.

Deputy Ernest Schaeffle and Frank McCrea took a large shipment (ten cans) representing all three varieties, and planted them successfully in Clear Lake, Lake County.

Deputy Andy D. Ferguson at Fresno received and planted yellow perch and sunfish in Kings River, Lower Kings, and San Joaquin rivers.

Deputy A. C. Tibbet at Bakersfield received a shipment of sunfish and yellow perch, which were planted in the lower reaches of Kern River and Buena Vista Lake. Other shipments were planted in a small lake near Tehachapi, Kern County, in Russells Lake, Ventura County, and the remainder of the shipment was received by eight other applicants at points in Los Angeles, Riverside, and Orange counties.

The superintendent of fish distribution, Mr. R. W. Requa, joined the Federal car at Truckee and superintended the distribution and allotment of the fish to the various applicants.

It is yet too early to expect definite results, but some specimens of young bream and the blue-gilled sunfish have been received at our office, which were taken in waters of the Sacramento Valley, indicating that they are increasing.

TRANSPLANTING ADULT TROUT IN THE SOUTHERN SIERRAS.

During the past two years special attention has been given to stocking barren lakes and streams on both sides of the higher Sierras in Inyo, Tulare, Kern, and Fresno counties with adult fishes—golden, Kern River rainbow, and Loch Leven trout. The two last named varieties were taken from waters that had been stocked some years before with fry raised at our Sisson Hatchery and which had been transported as far inland as it could be done with safety. The golden and Kern River trout were taken from streams where they are abundant and placed in other waters barren of fish life in the same general locality.

The sum of $1,250.00 was appropriated for the work, which enabled us to equip two pack trains with specially built cans, and other necessary apparatus. Deputy E. H. Ober, assisted by Sheriff Naylor of Inyo County, had charge of the work on the eastern slope, and in the face of many difficulties successfully transferred a large number of golden trout into waters heretofore barren of fish life, but rich in fish food.

District Deputy A. D. Ferguson of Fresno, assisted by Deputy S. L. N. Ellis, directed the pack train work in 1909 and 1910 in the Kern River, Kings, and Kaweah basins on the western slope. Adult golden trout were captured in very satisfactory numbers and successfully transported and planted into Crabtree Fork of Big Kern, North Fork of Kaweah River, and Whitney Creek. Adult rainbow trout were planted in four tributaries of Sugar Loaf Creek and other tributaries to Kings River in 1909. In 1910 Huckleberry Ellen and Spotted Faun lakes, in Tuolumne County, received 1,400 adult rainbow trout. Adult Loch Leven trout were placed in Rock Creek; Loch Leven fry in 18 cans distributed by pack trains in Pitman, Coyote, Red Mountain Bear, Shaver, and seven Dinkey lakes.

Adult rainbow trout were taken and distributed in considerable numbers into South Fork of the San Joaquin above Jackass Falls and four other headwater tributaries of the same stream. Sixteen tributaries of the Kings River, including lakes and streams in Granite Basin, received liberal plants of adult fish. All are ideal trout waters, but heretofore barren of fish life. It is confidently believed that this vast region will in a few years become a fisherman's paradise.

Much credit is due to the officers and members of the Sierra Club, who, under the skillful directions of Secretary Wm. E. Colby, have at their own expense, but under the authorization of this Board, successfully transplanted during the past two years more than 400 adult golden trout in the vicinity of Mount Whitney.

In July and August, 1910, more than 1,800 large golden trout of the two varieties were taken with hook and line by our deputies and distributed among 23 lakes and streams in which no fish have heretofore existed. In suitable places—meadow streams—seines were used to take the fish, but by far the larger number were taken with hook and line.

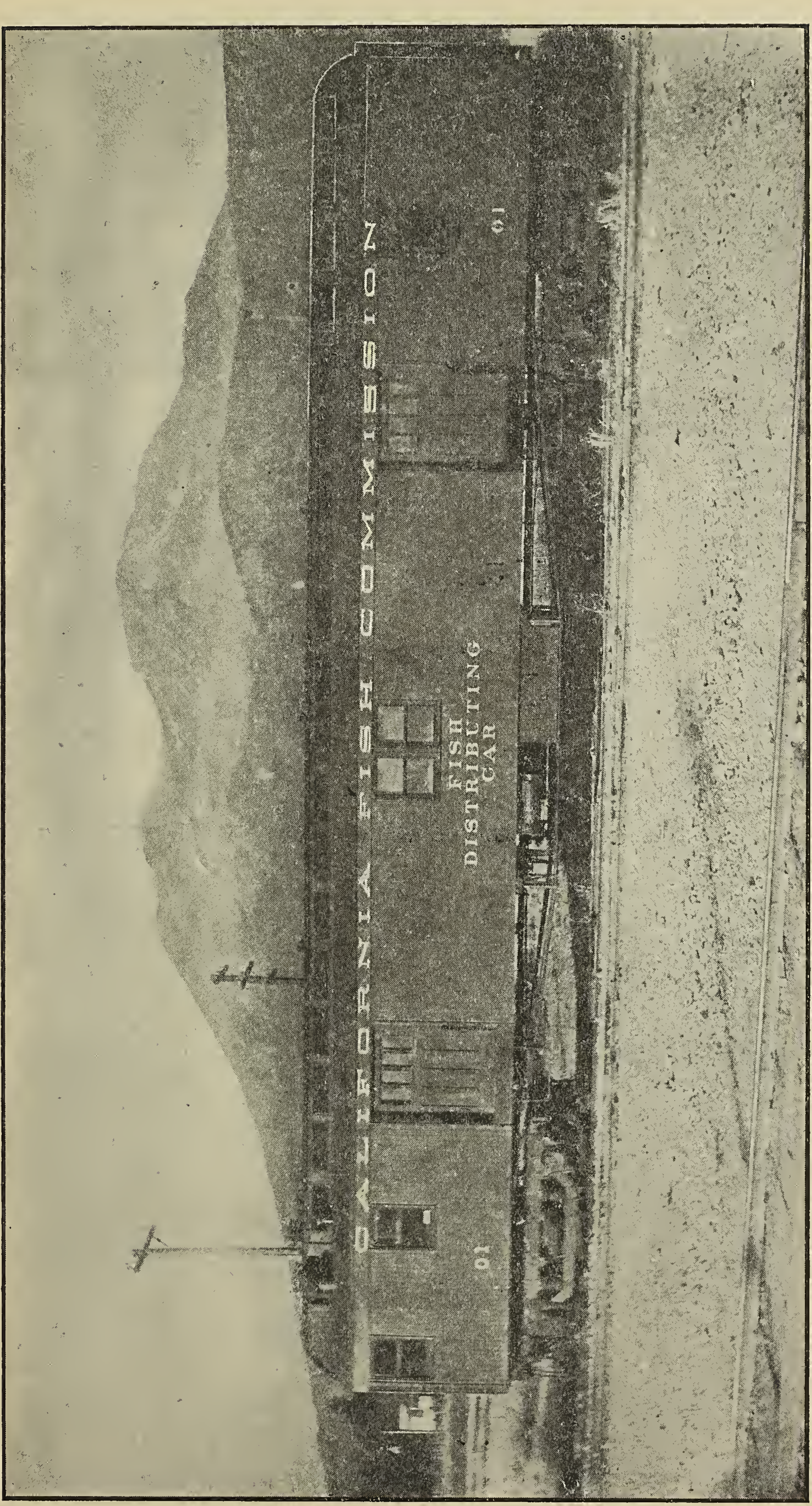
Some idea of the arduous character of the work is shown by the plants made in Deadman's Canyon, which occupied six days of pack-horse travel over a very rough country. The fish were true type, *Salmo roosevelti,* taken with seine at Whitney Meadows and planted with the remarkably low loss percentage of six fish out of 183, all adults.

THE FISH DISTRIBUTING CAR.

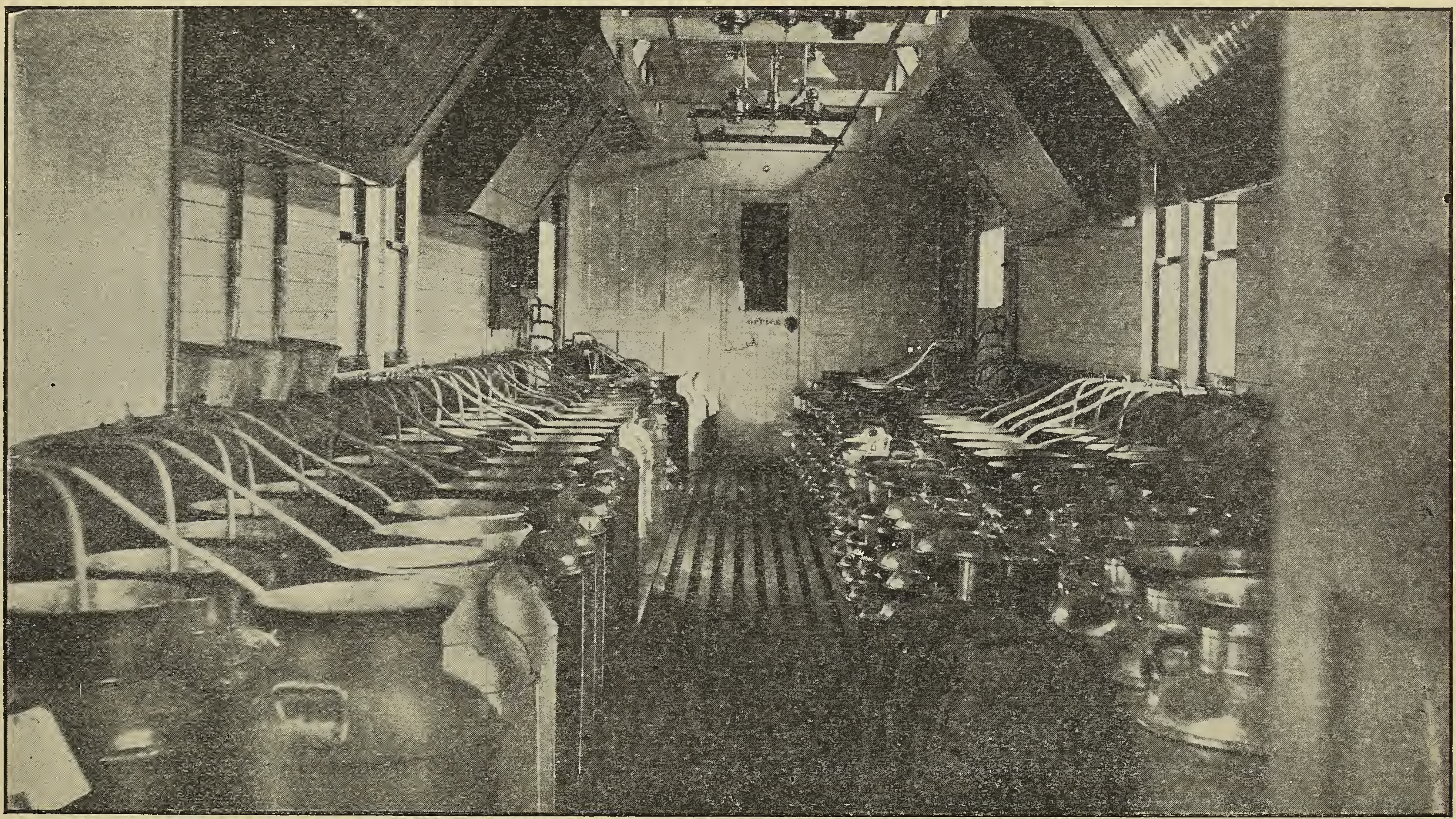
During the thirty-seventh legislative session an appropriation of $7,500.00 was secured for the purpose of acquiring and equipping a car to be used to distribute the fish raised in our hatcheries. At our principal hatchery, located at Sisson, the output was practically limited to the number of cans of fish that could be shipped between July 1st and November 15th of each year in the limited space that could be found in the crowded baggage or express cars, and which rarely accommodated twelve cans. On the long trips to southern California, occupying two nights and one day, the services of two men were required to handle twelve cans of fish and a week's time was occupied in making a round trip. Realizing that with better facilities to handle them not only could the output be increased and the fry reach the waters to be stocked in better condition, but the expense of distribution would be considerably reduced. The Chief Deputy, Mr. Chas. A. Vogelsang, being called to Washington to attend a meeting of the National Breeders' Association, was directed to inspect the fish distributing cars of the United States Bureau of Fisheries, of which there are six, with a view of getting the best ideas to incorporate in the new car under consideration, and the same was accordingly done. Through the courtesy of Mr. E. E. Calvin, general manager of the Southern Pacific Railroad Company, we were enabled to purchase for the sum of $4,500.00 a 60-foot substantially constructed baggage car. This car was then placed in the general car shops of the Southern Pacific Company at Sacramento, where under the personal supervision of master mechanic Heintzleman it received a complete and modern outfitting, including new trucks with steel wheels, air brake equipment, suitable lights, appropriate lettering and painting.

The interior was fitted up with four sleeping berths, following the plan of upper berths in Pullman cars, complete galley with six-hole range, tableware and table to accommodate the crew of four men. One end of the car was partitioned off and fitted up as an office for the superintendent of the car. The car also contained two steel tanks with a capacity of 500 gallons each, in which fresh water is carried as a reserve to replenish the supply in the cans carrying the fish should occasion arise. At the other end is located the engine room, in which is installed a steam boiler, two Westinghouse air pumps, a refrigerator, and the culinary department.

Under regular service conditions but one air pump is run at a time, but they are used alternately. The pumps compress air into an auxiliary tank or reservoir at a pressure of 80 pounds to the square inch, from which by using a reducing valve it is supplied to the cans containing the fish at 15 pounds. Before reaching them the air passes



Fish Distributing Car.



Interior of Fish Distributing Car.

through a system of coils placed in the bottom of the refrigerator, which chills it sufficiently to obviate the use of ice in the cans, where a temperature ranging between 48 and 50 degrees is constantly maintained. This plan also effects a saving in our ice bill over the former method of about 60 per cent.

The former crude method of aerating by hand every ten to twelve minutes, which meant lifting a half gallon dipper of water several feet above the can and pouring it back, has been abandoned.

Such treatment was hard on young, delicate fry, as through that operation many of them were injured or killed by being brought sharply in contact with the blocks of ice necessary in each can to maintain the water at a proper temperature. By the present method this danger is entirely overcome, as ice is not required until the cans leave the car.

Instead of having two men take between them twelve cans containing approximately 50,000 fish, the car with four men will easily carry ten times as many, or 500,000 fish, on a single trip. It has enabled us to treble the output from Sisson with very slight additional expense to the State.

Another important feature not to be overlooked is that by the aid of this car, which is really a traveling hatchery, we are enabled to concentrate our experienced force where best results can be obtained at small cost compared to the establishment and maintenance of other trout hatcheries where ice in quantity is not available, and transportation and distribution facilities totally inadequate. The car has fully met our expectations in all respects. The fish are being delivered in fine condition with practically no loss to any section of the State.

We are pleased to report that notwithstanding the stringent terms of the Wright railroad commissioners' bill, a liberal construction of the law was given by the Railroad Commissioners and the Attorney General, resulting in the different railway companies hauling our car and its crew free of charge.

During all stages of its construction our Mr. R. W. Requa was in attendance, and since going into commission, he has had full charge of the car, its crew and equipment, and we believe that to his energy and intelligence is due most of the credit for the success of the first fish distributing car in the West.

STATE GAME FARM.

As the hunting license law produced ample funds, and believing that the establishment of a State Game Farm where game birds could be raised in captivity and operated along the same lines as fish hatcheries, would be in entire accord with the spirit of the law, which authorizes expenditures for the propagation and restoration of game, and being encouraged by the example of other states, it was decided to undertake the establishment of one in California. Negotiations for services were entered into with several men who had had experience on game farms in Eastern States, also with Mr. J. R. Argabrite, a resident of California, who was a successful raiser of pheasants in Ventura County. This resulted in engaging the services of Mr. Argabrite in September, 1908. He was immediately detailed to examine and report on a number of different locations that had been offered for the establishment of such an institution. The choice finally fell upon some 45 acres located one mile west of Hayward, in Alameda County, owned by Mrs. H. G. Bedford. A lease was executed for one year, with a privilege of nine years additional, at the rate of $450.00 per year. Possession of the premises was assumed in November, 1908. An artesian well, which furnishes an abundance of water, was bored, and the construction of a barn, pens, brooders, and other necessary equipment was immediately begun. A contract was let for the building of a cottage for the superintendent. A stock of pheasants to be used for breeding purposes was purchased through Wenz & Mackensen, of Yardley, Pennsylvania, importers of choice European wild stock. Some were brought in from Oregon and others purchased from breeders in our own State. We also added to

State Game Farm—Male Hungarian Partridge.

the stock by withholding from distribution four dozen Hungarian partridges out of some 1,500 that had been purchased for distribution throughout the State. Owing to the fact that many of our imported pheasants did not arrive until the beginning of the breeding season, we collected comparatively few eggs the first year. The birds that were bought in our own State and Oregon were the first to arrive and were in prime condition at the breeding period. We raised approximately 1,200 young pheasants the first season, of which number about 800 were distributed in sections that in our opinion were specially adapted for their increase under wild conditions—Siskiyou, Humboldt, and Inyo counties receiving the largest number, ranging from 75 to 80 birds in each plant. Smaller shipments were made to other portions of the State and some given to private individuals who were properly equipped, and others liberated where conditions were favorable both as to environment and protection. In all, twenty counties received pheasants from the Game Farm the first year. A serious loss was sustained in October, 1909, through an act of vandalism—the pens being maliciously opened during the night, and many pheasants and valley quail were given their liberty. We were holding at the Game Farm for distribution at the end of the open season a large number of valley quail that had been trapped in remote sections where they are superabundant, and were to be used to restock public lands where through excessive shooting and interbreeding the supply of valley quail was

View of State Game Farm.

greatly reduced. Fortunately our superintendent was able to recover about three fourths of the pheasants, but the valley quail to the extent of 30 dozen were a total loss as far as the Game Farm was concerned. This outrage was followed within a few days by another more serious, when poisoned wheat was scattered in some of the pens that had not been opened, which killed a great many birds of all kinds. We estimated our total loss through escapes and poison at approximately 300 pheasants, 600 valley quail, and a few Hungarian partridges. A substantial reward was offered for information that would lead to the detection of the guilty party or parties. The matter was also placed in the hands of a well known detective agency, but sufficient evidence was not produced to justify taking the matter into the courts.

We retained from the previous year's hatch about 100 young birds for the season of 1910, and reared about 2,500 young birds until they were about six weeks old, at which time we met with another serious loss through a plague of rats that seemed to concentrate their efforts on the Game Farm, and cost us many young birds.

The improvements at the Game Farm are all of a substantial character, and were built with a view of meeting with requirements for a period of ten years. The total cost, including the original cost of birds, barn, residence, pumping plant, boring of a well, brooders and pens, is approximately $10,000. The working force has never exceeded three men, part of the time but two. We have through the sale of eggs and domestic poultry received returns in the shape of Game Farm earnings up to June 30, 1910, of $938.32, which is more than double the amount of the annual rental of the premises.

Our farm was recently visited by Dr. T. S. Palmer of Washington, D. C., in charge of game preservation in the United States. He pronounces it one of the best game farms that has come under his observation and one which he believes has a great future. The propagation in captivity of both game birds and animals is strongly encouraged by the Federal Department having charge of game preservation. It is believed to be the surest way to preserve and increase the wild game, and will furnish to those who do not hunt an opportunity to satisfy their tastes for wild game by purchasing it, either in the open markets or having it served to them at hotels and restaurants. Where pheasants have been furnished to private individuals from the Game Farm it has been with an agreement that a percentage of the increase in excess of the original stock should be returned to the State, either directly to the farm, or delivered to others, by order, who would take up seriously the propagation of pheasants in captivity. In the Appendix will be found a chapter on pheasant raising, which contains in condensed form sufficient directions to insure success, provided the instructions are carefully followed.

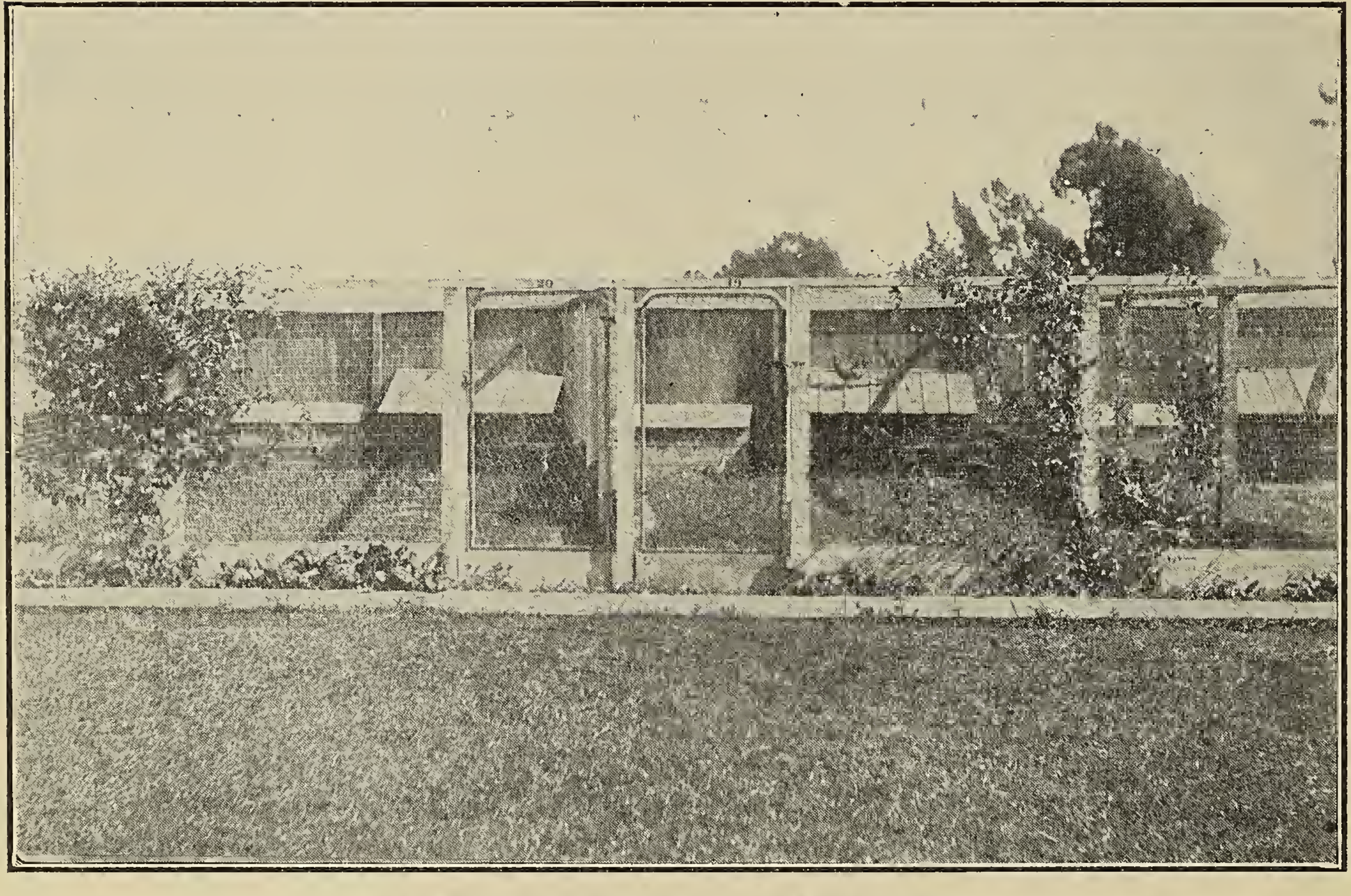
In the past three years much attention has been given to the transferring of valley quail from one part of the State to another. The birds are trapped in sections where they are abundant and shipped to others where through excessive shooting and deterioration, caused by inbreeding, the coveys have become greatly reduced. We are pleased to report that excellent results have followed in bringing together the unrelated stock, which is shown by larger coveys and stronger birds. In 1908 more than 2,000 quail were trapped and transferred; in 1909 our trappers delivered to the Game Farm 256 dozen, or more than 3,000 birds.

In the southern part of the State, under the direction of our Los Angeles office, some 1,500 quail were trapped in Lower California, transferred successfully to Los Angeles, where they were retained in a public park until the end of the open season, when they were liberated in suitable localities. Earnest efforts have been made and considerable time spent to obtain new blood from Mexico, but owing to unusual conditions but few birds have been procured from that country up to the present.

WILD TURKEYS (MELEAGRIS GALLOPAVO).

In response to requests and suggestions from a number of sportsmen in our State we had for several years made efforts to secure from Virginia, Texas, New Mexico, and Arizona, states in which wild turkeys are yet found, a sufficient number to give them a trial in California, believing they would establish themselves if given reasonable protection. We found the laws of New Mexico and Arizona so strictly drawn that no variety of game birds or animals could be shipped outside their boundaries for any purpose whatsoever. We appealed to the attorney generals of each state, and while we were assured of their personal inclination to help us out, they were bound by the law to rule against our request. We then decided to go outside of the United States and accordingly, in March, 1908, W. E. Van Slyke of San Bernardino, who had spent several years in Mexico, during which time he had hunted and killed wild turkeys, was detailed by this Commission to proceed to the State of Sinaloa, Mexico, for the purpose of procuring and shipping to our State as many of these great game birds as could be obtained in four months. He delivered 22 turkeys and 11 ''chachalacas'' at San Bernardino on June 15, 1908. They were liberated in two places in the San Bernardino range of mountains at an elevation of about 4,000 feet, under the direction of Senator H. M. Willis (author of the hunting license law). Encouraging reports having been received from these plants, a shipment of 30 young wild turkeys, raised at the Game Farm, was made to the same section in August of the present year.

The services of Mr. Van Slyke were reëngaged in October, 1908, to procure additional stock to be used for breeding purposes at the Game Farm. He was again successful and shipped to us, via Mazatlan, 26 fine specimens, which reached their destination in excellent condition. From this stock there was raised at the Game Farm in the spring of 1909, upwards of 100 strong, healthy, young birds, of which number 48 were sent in care of Mr. Jay Argabrite to Wawona in October, 1909, and liberated in the lower part of Yosemite Valley. Feed was scattered about, enough to supply their wants for several days. Although raised in captivity and not accustomed to anything higher for a perch than ordinary domestic fowls, they flew to the tops of tall trees immediately after liberation. Conditions seemed favorable for them so far as feed was concerned, and they have been reported as seen by several reliable persons, but no increase has been noted.



A section of breeding pens, Game Farm.

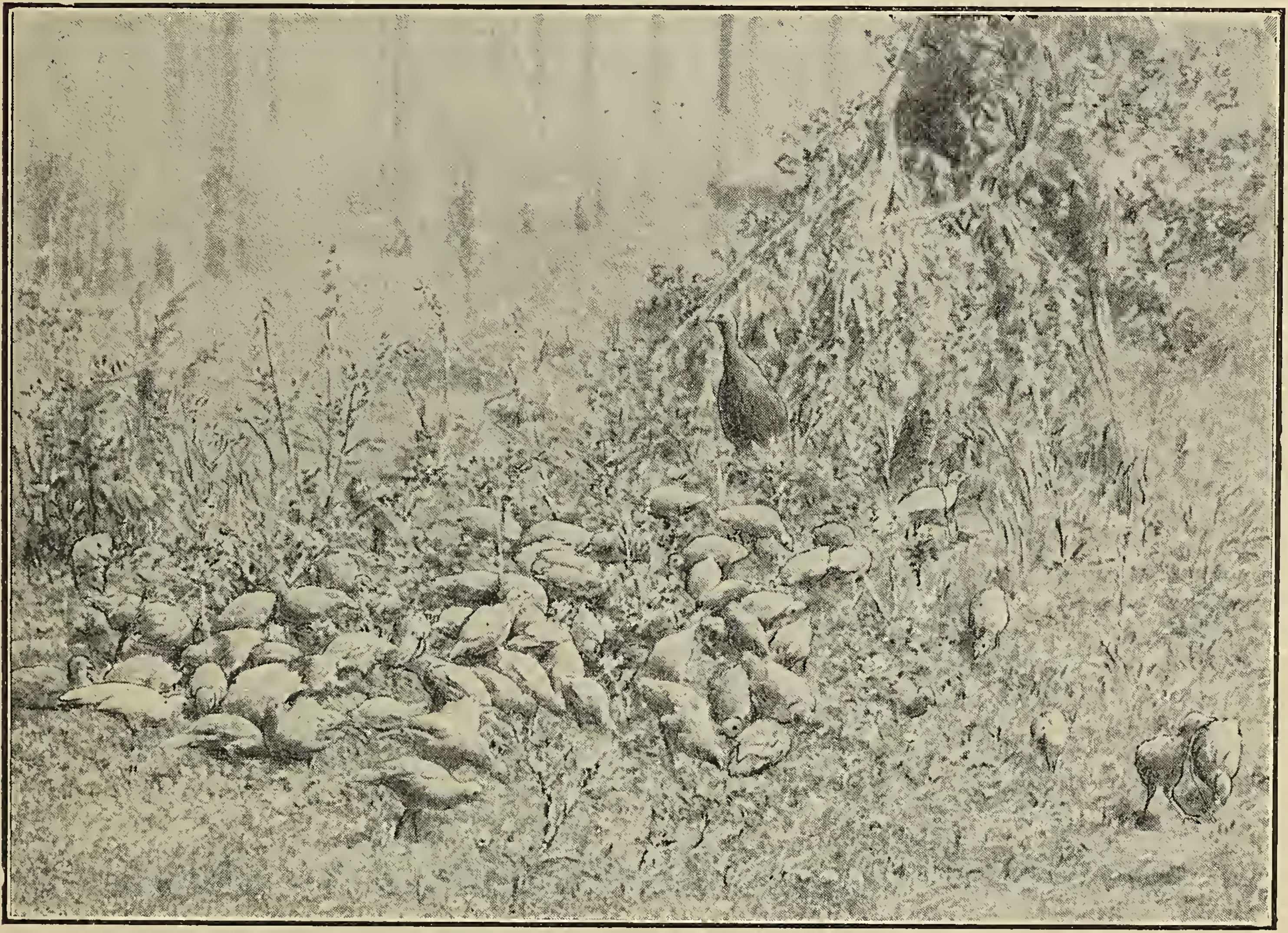
A shipment of 34 birds was made to the Sequoia National Park in eastern Tulare County in November, 1909, and placed in charge of Mr. Walter Fry, acting superintendent of the park, who has kept them under close observation and furnished this office with intelligent, trustworthy and most encouraging information concerning them. Quoting from his official report of January, 1910, he says:

> The wild nature of the turkey has fully reasserted itself; they are the most wary bird in the park. They will not run at the approach of an intruder, but will fly a mile before alighting.

In February, 1910, he reports finding a nest with 5 eggs; in March two nests, one with 11, the other with 16 eggs. On March 21st he reports "The wild turkeys doing fine. One hen has seven young birds." May 21st: "Wild turkeys seen are doing fine; many tracks of young birds, all seen at various places." Under date of July 14, 1910, referring to this season's shipment, he said:

> Wild turkeys were this day liberated in the Sequoia National Park at the mouth of the Marble Fork of the Kaneah River. They were in good condition and no losses sustained. I have left a man to care for them for a few days, although there is abundant feed for them at the place. They seem quite contented in their new surroundings and some flew up into the tall trees.

For the season of 1910 we are pleased to report remarkable success, having raised upwards of 200 young wild turkeys, of which number 85 were sent to the Sequoia National Park, 10 to citizens of Porterville, Tulare County, who liberated them in a particularly favorable section, and 30 to San Bernardino County. We feel greatly encouraged over the success attained thus far in the introduction of these magnificent game birds, and firmly believe that they will establish themselves permanently. There is no reason in our opinion why they should not thrive in this State. They have been known for many years in Arizona and New Mexico, and would, we believe, have reached California but for the great American desert, which encompasses our entire southern and eastern borders, and has always been an impassable barrier.



State Game Farm—Wild turkey hen with brood of young pheasants.

The young are easy to raise, being apparently a much hardier bird than the young of domesticated turkeys, whose vitality undoubtedly has suffered through too much domestication and inbreeding. The total cost to the hunting license fund of our venture in procuring and shipping from Mexico to our State the wild turkeys is less than $1,900.00, which includes the services and traveling expenses of Mr. Van Slyke for two trips.

Some question having been raised as to the genuineness of our stock, we were greatly pleased to have Prof. F. E. L. Beal of the United States Biological Survey, who has made a study of the wild turkey of the United States and Mexico, advise us after a visit to the Game Farm, that our stock was of the best; that there could be no doubt we had the genuine wild turkey. This was further confirmed by Dr. T. S. Palmer, in charge of Game Preservation of the United States, who pronounced them of the best strain of wild stock that had even come under his observation.

It is not commonly known that America, with special reference to Mexico, has given to the world the largest game bird, and perhaps the most important domestic fowl, in the turkey. The Pilgrims landing on our New England coast found them in plenty, and they filled an important place in the food supply of the Indians. It is reported they were introduced into England from Mexico in the sixteenth century, about 1541, and in 1573 had become the Christmas feast of the farmer.

Prof. S. F. Baird in a report to the Agricultural Department published in 1866, speaking of the Mexican turkey, says:

> Among the luxuries belonging to the high condition of civilization exhibited by the Mexican nation at the time of the Spanish conquest, was the possession by Montezuma of one of the most extensive zoological gardens on record, numbering nearly all the animals of that country, with others brought at much expense from great distances, and it is stated that turkeys were supplied as food in large numbers daily to the beasts of prey in the menagerie of the Mexican Emperor.

The well known ethnologist and ornithologist, George Bird Grinnell, in speaking of the wild turkey, says:

> The original wild turkey—to which the name *Meleagris gallopavo* was given—has been shown to be the bird later described by Gould as the Mexican wild turkey. It is notably different from the eastern form, for its tail, tail coverts, and the feathers of the lower rump are tipped with white or whitish, while the eastern and northern turkey has those feathers tipped with deep rusty or even with rich dark chestnut. The ordinary domestic turkey shows the whitish tippings of the feathers of tail, tail coverts, and lower rump; characteristics derived from its ancestor, the turkey of Mexico. The Mexican turkey occupies the wooden mountain slopes bordering the Mexican tablelands on the south and west, ranging north to Chihuahua, but it does not reach the United States. Mr. Nelson has shown where it grades into the Merriam's turkey on the north, while to the south, in southeastern Mexico and Central America, it is replaced by a striking distinct species, the brilliantly hued ocellated turkey.
>
> The eastern wild turkey, which was long considered the true *Meleagris gallopavo*, thus becomes a subspecies of the Mexican turkey, and is now known as *Meleagris gallopavo silvestris.*

THE HUNGARIAN PARTRIDGE.

During the past two years we have liberated in thirty-nine counties of the State about 2,400 of these famous European game birds.

A wide distribution has been given them from San Bernardino and San Diego counties in the south to Siskiyou County in the north. From many sections in the central, northern, and eastern parts of the State encouraging reports have been received. From the southern part of the State, San Bernardino County seems the only one in which the birds can now be found, and one covey containing 100 birds is reliably reported to be known in Yucaipe Valley. In Sonoma County, near Santa Rosa, several coveys aggregating 200 birds are reported. Increase is noted in Sierra, Siskiyou, Lake, Napa, Mendocino, San Benito, and Tehama counties. Excellent and trustworthy reports showing strong increase have come from Butte and Inyo counties.

According to Mr. Henry Oldys, assistant of the United States Biological Survey, during the past two years ''nearly 40,000 partridges have been transplanted from the game covers of Europe into those of America,'' previous to which time less than 8,000 had been imported.

This indicates a strong and widespread belief in the adaptability of the Hungarian partridge to this country. It is unquestionably regarded as the most promising of the foreign birds whose introduction is being attempted. The small state of Connecticut has in the past three years imported and liberated nearly 7,000 and the sportsmen of that state have found so much encouragement in the increasing number of coveys that further efforts are being made to increase the supply by additional importation. Illinois, Indiana, Nebraska, and New Jersey have met with sufficient success to justify further expenditures. From the state of Washington it is reported ''that along the northern border of the state Hungarian partridges have become almost as plentiful as pheasants.'' A carefully planned and successful attempt to introduce these birds is being carried on by Commissioner Sweeney of Indiana. He says, ''I have 10,000 Hungarian partridges in the state of Indiana on 160 game preserves, and during the next three months will distribute about 8,000 more. They have thriven exceedingly well and are proving themselves finely adapted to Indiana climate and agricultural conditions. I feel they are the coming game bird of the Middle West.''

The original habitat of the European partridge was on the shores of the Black Sea, and it is claimed ''that from there they spread, following in the steps of grain cultivation throughout central and northern Europe.'' While we recognize that in the valley quail our State possesses perhaps the finest game bird in the world, under the rapidly changing conditions caused by clearing off and settling of the wild lands their breeding ground is steadily being reduced, the coveys growing fewer and smaller except in the remote sections of a few counties. To meet this situation and fill the gap caused by the encroachments of civilization it was decided to make a trial with the Hungarian partridge, which, according to some excellent authorities, is in a manner dependent on man, and tend to increase on arable or cultivated land, and where there is none, or it has been changed to pasture they seem to decrease. As they are not a ''brush'' bird, it is believed they would readily adapt themselves to the conditions to be found in our great grain and fruit growing valleys from which the valley quail have practically disappeared.

In size they are somewhat larger than our mountain quail, but much swifter on the wing. Their food covers a considerable variety, all kinds of insects, wild berries, grain and other seeds, and almost any kind of green food. In appearance they are not unlike the bobwhite quail of the Eastern States, but fully twice as large and more prettily colored. The head and throat are of a light reddish brown color, with yellow stripes on the top of the head. A distinguishing feature is a brown shield in the shape of a horseshoe more or less distinct on the breast.

Like the bobwhite the partridges of Europe sleep on the ground in circular groups with heads pointed outward, ready to detect the approach of an enemy from any quarter and to scatter in every direction when danger threatens. They are not polygamous, but separate into pairs early in spring and seek places for nesting and raising of their broods. At this time the males become very pugnacious, and will attack vigorously any intruders of his own kind. The nest is a very simple affair, built on the ground in a small hole after the fashion of our valley quail. The eggs are laid on the bare ground and covered with grass and leaves. When the hen has finished laying she proceeds to place the grass and leaves underneath the eggs. A young partridge hen will lay from 8 to 12 eggs, and an old hen from 16 to 22. The male assists the hen in rearing the brood, and shows much skill in protecting and feeding the young birds. When able to fly the old birds take them out to the roads to dust themselves and search for ants' eggs and insects, which form their chief diet until they are full grown.

Contributors to *London Field* in 1904, and again in 1909, in speaking of partridges say: ''The value of Hungarian partridges has of late years been fully demonstrated and their introduction has now long passed the experimental stage.'' * * * ''The advantage of turning out Hungarian birds can not be overestimated. They are suitable from every point of view, stronger and hardier than our native birds, and therefore more capable of rearing large coveys.''

To the Yearbook of the United States Department of Agriculture for the year 1909, in a pamphlet on ''Introduction of the Hungarian Partridge in the United States,'' we are indebted for excerpts and descriptions.

THE $20 BOUNTY ON MOUNTAIN LIONS.

As soon as it was seen that the hunting license law was proving a financial success, and realizing that strong demands had been made on the legislature for a bounty on these marauders by stock raisers and people of the mountains generally who had suffered through their depredations, the Board believed that the payment of a bounty on these animals would further popularize the hunting license law by making the people of the county beneficiaries under it, and decided that sufficient authorization existed in section 10 of the hunting license law, referring to expenditures for game preservation and restoration. This opinion was concurred in by the Attorney General, representing the State Board of Examiners, and by the State Controller. We, therefore, began in November, 1907, to pay a bounty of $20.00 for the scalp or pelt of every lion sent to this office. In order to protect the State against fraudulent claims an affidavit is required for every scalp from each individual presenting a claim, which must show when and where the lion had been killed, and requiring in addition a letter giving the circumstances of the case.

Some criticism was made as to the liberality of the bounty, but careful investigation showing that it required trained dogs and sometimes days and weeks of time to capture a single lion, the Board felt justified in making a generous allowance, believing that the greater the incentive, the quicker would be accomplished the desired result—the decimation, if not extermination, of the mountain lion, which is the natural enemy of the deer—besides which he destroys much of the farmer's live stock. He seems to have a fondness for colts, but does not spare calves, pigs, sheep, or goats. This is confirmed by letters that have been received in this office from the applicants for the bounty, yet fully 90 per cent of them indicate that the stomach contents are deer meat. It is also shown that a lion seldom devours the entire carcass, except driven to it by hunger; that he appears to prefer the fresh blood of an animal, after which the carcass is covered with leaves and brush and only eaten as a last resort.

The experienced mountaineers claim that the lion kills from one to three deer a week each. To substantiate this claim we append hereto several letters, representing hundreds of others, all bearing testimony to the damage the lion will do to live stock as well as to deer:

MENDOCINO COUNTY.

COVELO, CALIFORNIA, February 20, 1908.

Board of Fish Commissioners, San Francisco, Cal.

DEAR SIRS: I write to you on a subject that I came near writing to you about last spring, but as you have done what I should have urged, that is, put a bounty on panther, or California lions, I now write to commend you for doing that, as I don't think you could have done anything that would have done more toward the preservation of the deer than putting a bounty on panthers.

Mountain lion "treed."

In the southeastern part of Trinity County, where I was last summer with a band of sheep, I found about thirty deer carcasses in a strip of country about a mile long by a half a mile in width that had been killed by panthers during the winter and spring.

In the winter time the snow drives the deer down into the streams in large numbers and keeps them there till it goes off in the spring, and the panthers, also driven down from the higher mountains, kill a great many of them; and they are also very destructive on the farms in the spring and summer. So, taking everything into consideration, they are very destructive on the game.

The people in this part of the country appreciate the effort you are making to preserve the game.

Yours respectfully,

[Signed.] James A. Foster, Jr.

HUMBOLDT COUNTY.

Shelter Point, California, February 3, 1909.

To the State Board of Fish Commissioners, San Francisco, Cal.

Gentlemen: I wish to write you a little hunting story which came under my notice. Since January 22, 1909, William Barrow, a resident of this section, has killed five panthers and one lynx. Mr. Barrow's last panther left a tale which shows how destructive these brutes are to the deer.

According to Mr. Barrow, his dogs would not run the track when he came across it in the snow, but he, being an experienced hunter, knew that, although it was a day old, he stood a good show to raise him before night, so he followed the track. He did not raise him the first day, but went again the next day. During the time he followed this one animal Mr. Barrow came across five deer, all killed by having their throats torn out, but not otherwise badly injured. He followed him up the mountain into the deep snow, where deer were plentiful, and it was here that the panther showed his work. He went on higher until the snow became very deep and deer scarce, then he circled back down and returned to the last deer which he had slain. It was at the last deer that Mr. Barrow's dogs surprised him, and the chase did not last long, for he evidently had eaten too much venison.

Mr. Barrow brought his scalp in to-night and told me this story. He also killed one lynx while taking the five panthers. Hunting panthers with dogs is mighty hard work, especially when a man has from two to five feet of snow to contend with, and if it was not for the $20.00 offered by your Board, you can rest assured that even Mr. Barrow would not be putting in time looking for that kind of game. That the $20.00 reward, or bounty, has done more for the protection of deer than anything else that ever happened, and I believe that if we were able to exterminate panthers, lynx, and cats, the country would be overrun with deer.

I have been a mountaineer for over eight years and a close observer of violators of game laws, and I think I am perfectly safe in saying it's not the people who make game scarce, it's wild animals. The people in this section are all in sympathy with the game laws and never complain about the one dollar license money. Game seems on the increase (all kinds, I mean), and there are but few violations.

Very truly yours,

[Signed.] C. A. Chamberlain, Forest Ranger.

LAKE COUNTY.

Lower Lake, California, January 9, 1910.

Fish and Game Commissioners, San Francisco, Cal.

Gentlemen: As you wish a letter stating how this lion, killed November 15th, was taken, perhaps it will interest you to have the details just how it all came about.

Early on the morning of November 15th I received a telephone from one of my herders to the effect that some animal had made a raid on his flock of goats the night before and killed some seventeen or eighteen head.

I at once saddled my horse and in about three hours was at the place of the killing. I immediately concluded it was our old enemy, and didn't have to wait long until my pack of hounds were in hot pursuit. After about an hour's fast running, he was forced to take a tree in a thick jungle of brush. It took us some time to crawl to the foot of the tree, and it was then that my herder, who was slightly in advance, fired, but being somewhat excited failed to kill the lion, only causing it to come to the ground, where he was met by twelve hounds eager for a fight. All was excitement for a few minutes until I managed to bring him down with a couple of bullets from my Winchester. One of my dogs lay dead, while two more were bleeding from numerous gashes caused by the lion's claws. I was very much pleased with my day's work, as was a number of my neighbors. This lion had become quite a dread to the stockmen in this community, as in the last two years he had killed several colts and calves, besides a great number of small stock.

Kindly thanking you for the generous bounty, I am,

Most respectfully,

P. A. Jones.

MENDOCINO COUNTY.

Point Arena, California, February 12, 1910.

Fish and Game Commission, San Francisco, Cal.

Gentlemen: I am shipping you to-day, February 12th, two panther hides, one small one weighing about 80 pounds and one large one weighing about 150 pounds. The large one was killed on the 8th instant and the smaller on the 10th. Both were treed with hounds. Although several carcasses of sheep were lying on the range, where they had killed them, one's stomach was full of deer meat, and the other was entirely empty. I also found the carcasses of several deer in that vicinity, which shows that the deer is a favorite prey of the panther.

Please return the hides by express to Point Arena. Unfortunately I broke several inches of the larger one's tail, which decreases the length. Originally it was close to 10 feet. Have made out two affidavits, which I hope will be sufficient. Please send bounty to Point Arena. Any information I can give you in regard to the habits of the panther will be freely given.

Yours respectfully,

L. N. Campbell.

TRINITY COUNTY.

Bee Gum, California, April, 1910.

To the Honorable Board of Fish Commissioners, San Francisco.

Sirs: I am shipping you to-day the scalps of three lion kittens and the skins of two old ones. I would like to add a few words in regard to lions, but first would like to say that there was a report started by two men in this neighborhood last fall that your honorable Board had discontinued the paying of a bounty on lions, which saved the lives of several lions and caused the death of a great many deer, to say nothing of the stock they killed. I myself knew nothing to the contrary until I happened to meet Mr. J. R. Watson of Trinity County, and he showed me a letter he had from you last fall in contradiction of the matter. I had had two dogs on the chain for two months and it took some time to get them in shape again.

These five lions represent a month's hunting and a scope of perhaps 35 or 40 miles of the roughest country in northern California. I have fine dogs. We got every lion that we found the sign of, with the single exception of the mother of the kittens, and I hope to get her yet. We hunted the largest of these lions, the male, fifteen days. His track was always too old for the dogs, but we finally struck it one morning fresh, and got him in an hour. In our hunt after this lion we found 12 deer that he had killed. Some he had only taken one small feed out of and never returned to them. I know this to be a fact, as we went morning after morning, hoping to strike his track at the carcasses, but a male lion will not do this if he can get a fresh deer. When he is hungry he never comes back. When they have all they want—they take one feed in twenty-four hours—and a large lion will eat a deer in two or three days. These are facts, as I have been in the mountains most of my life, and have made something of a study of animal life of all kinds. On the other hand, a female lion with kittens, and they hunt for the kittens until they are over a year old, of which they have from two to four, and there has been cases where five were found, but most often two to three; she kills a deer and takes a feed out of it, and the kits stay and finish it up while she gets another. A female lion with two or three kits will eat a large deer in twenty-four hours. It is an easy matter to get the kits if one can find where they have a deer.

It isn't the hunters that is getting away with the deer, but the wild animals. With a few exceptions in this neighborhood, the game laws are strictly adhered to. Hoping you will excuse me for taking up your time with this string, I am,

you will excuse me for taking up your time with this string, I am,

[Signed.] W. R. McArthur.

MENDOCINO COUNTY.

Upper Mattole, California, February 20, 1910.

Fish and Game Commission, San Francisco, Cal.

Dear Sirs: Asking for information in regard to the three panther scalps sent to you, I will gladly furnish you with all the information I can in regard to the capture of them.

I was out on the range with my shepherd dog looking about stock when by chance I saw three panthers run around a point in the timber. Going down to where I saw them, my dog took the track and soon had one up in a tree. I got within reasonable good firing range and fired. The panther jumped and ran again, the dog in hot pursuit. On looking at his tracks where he jumped, I could see considerable blood. He ran about a quarter of a mile and treed again. Crawling up as closely as possible, I went to reload my gun and, behold, the shell had blowed off in my gun the previous shot, preventing me from reloading again. I then called my dog away and came home. Next morning, I went back to the place where I last saw the panther, taking with me three well trained hounds. I no sooner got to the place when the start dog took the track, and going slowly for about a quarter of a mile, started out briskly. Here I found two deer, a short distance apart, which they had been feeding on. The dogs ran half a mile and treed; going over there one dog had a small one up one tree, and a short distance away the other dog had another small one up a tree.

Killing both of them, I took a circle around the surrounding country in search of the third one. Had not traveled far until I came across another deer that hadn't been killed more than a few hours. The dogs took a fresh start, and in course of half an hour treed again. Going down to where they were, I could see a large panther in a tree. This was the mother of the two small ones. Well, as my gun was in good working order that day, I quickly dispatched this one, and this wound up what I consider a very profitable chase.

Starting back to my horse, and as I got near the place where I first saw them, I came across two more deer that had been killed recently, I suppose by these same panthers. Trusting this is satisfactory, I am,

Very truly yours,

[Signed.] Geo. C. Lindley.

LAKE COUNTY.

Lower Lake, California, May 4, 1910.

Fish and Game Commissioners.

Dear Sirs: I was out herding goats in the afternoon. It was about 2 o'clock. I was sitting under a tree watching the goats and I noticed something coming through the brush. I watched it and I saw it was a panther. It was after the tail end of the flock, and would have had a goat if I hadn't shot it as soon as I did. It had been in this country for several years—ten miles northeast of Lower Lake, Lake County. I have seen as many as a dozen small deer that the panther had caught. Some it had eaten almost up and others it had eaten all it wanted and covered the balance up with leaves and sticks. This is all I can tell you about the brute, only she has eaten lots of goats in this neighborhood.

Yours very truly,

Troy Meyers.

It will be observed that, according to the letter of Mr. McArthur, one male lion in fifteen days killed twelve deer. That statement is corroborated by a letter of J. E. Simpson of Orland, Glenn County, who states that in following the tracks of one lion six days, in July, 1909, he came upon the carcasses of five deer. This would indicate that one deer a week for a lion is a very conservative estimate, and yet that means fifty-two deer per year for each lion, which represents by the killing of 1,100 lions a saving of more than 57,000 deer.

From November, 1907, to September 1, 1910, the total number of lion scalps or pelts received at this office was 1,132, about 500 a year, which represents a drain on our funds of $22,000.00. We are satisfied that this money has been well expended and that the damage done by them is not overestimated. During the past two years the reports from our deputies and forest rangers show a larger number of does and fawns than have been seen in many years. In the northern, eastern, and central portions of the State deer are showing a decided increase. In southern California, by reason of forest fires, which have destroyed much deer cover, and with a large and increasing hunting population, no increase can be noted.

HUNTING LICENSE LAW.

In the nineteenth biennial report of this Commission the establishment of a hunting license law was urgently recommended, and a forcible argument presented to the thirty-seventh session of the legislature, with the result that such a law was placed on the statute books. It has met with the unqualified approval and support of all our people who are interested in sporting and the preservation of our game. The splendid financial returns have encouraged other states to follow our example. During the past two years New York, New Jersey, Iowa, Texas, Nevada, and Arizona has each come into line with a hunting license law, following closely the law of California. We are informed that the establishment of a similar law in the state of New York is due to the data and material furnished by us to the leading sportsmen of New York, who presented it before the legislature of that state. All of the states in the Union, also Alaska and the Canadian Provinces, require a license in one form or another. In a few states a license is not required from a resident, but nonresident licenses are required in all of them except Arkansas, whose nonresidents are not permitted to hunt. Four states, South Carolina, Tennessee, Georgia, and Louisiana, require that a market hunter take out a special license, the fee being $50.00 in the former, $25.00 in Tennessee and Georgia, and $10.00 in Louisiana.

In a number of states the *resident* license fee is greater than in California; Alabama charges $3.00, Washington and Alaska $5.00, Michigan and Wyoming $1.50, Connecticut, Vermont, and Oklahoma $1.25.

Some states issue to aliens a license for the same amount as a nonresident of the State, but a strong tendency is noted to make the fee for an alien greater than that of a citizen of the country. Our alien license fee of $25.00 is exceeded by a number of other states, for example, in Utah and Alaska the fee is $100.00, in Washington and Wyoming $50.00. In British Columbia, Yukon, and Saskatchewan $100.00 is exacted of an alien and nonresident alike. Certain provinces of Canada, Ontario, Manitoba, New Brunswick, and Newfoundland charge $50.00. The State of Pennsylvania goes even further and prohibits aliens from hunting or owning guns in the state.

As to the constitutionality of the law requiring aliens to pay a larger fee than citizens of the state, a recent decision of the Supreme Court of Alabama in the case of *Luke* vs. *Calhoun County* on the right of the state to impose different license fees, the language used by the court is clean-cut and decisive. It says in part: ''It is a legal and political axiom that protection and allegiance are reciprocal. Aliens, resident or sojourning here, do not owe the full measure of allegiance exacted from the citizen, nor can they enjoy the rights, privileges, and immunities of citizenship.''

At the last session of the legislature we recommended that the law be amended to permit a 10 per cent commission to be paid to every person selling licenses, except a fish and game commissioner. This became necessary in order to provide a way in which county clerks could be compensated for the money actually expended in postage, the labor involved in the issuing of licenses, and correspondence in relation thereto. A number of bills were introduced in the interest of county clerks asking that a commission be allowed ranging from 5 to 20 per cent. We believe the allowance of 10 per cent is ample. It means an annual drain on the fish and game preservation fund of at least $12,000.00. As the law has become thoroughly understood and the county clerks have distributed licenses in the principal towns in their respective counties, the postage charges have been greatly reduced. In none of them has it exceeded 4 per cent, leaving a margin of profit for time and labor of 6 per cent, which may be considered reasonable compensation.

The money derived from the sale of hunting licenses is used for the payments of salaries to deputies directly engaged in the enforcement of the game laws, in commissions to county clerks, the maintenance of the Game Farm, bounties on mountain lions, the trapping, distribution, and introduction of game birds, a proportion of office expenses, and the propagation of game fishes. Those who pay for hunting licenses are not contributing toward the support of the *commercial* hatcheries.

All fines of whatever character are paid into the same fund as the hunting license money, the fish and game preservation fund; they amount approximately to $16,000.00 a year, which more than meets the expense involved in the propagation of trout and other game fishes.

The amount of hunting license sales by counties since the law became effective, July 1, 1907, is shown in the tables given in the Appendix. The apparent discrepancy between these records and the amount shown by our financial statement is due to the fact that at the close of the fiscal year all county clerks had not made final settlement with the controller.

RECOMMENDATIONS.

Much confusion has been caused by the passage of county ordinances in which the seasons for the taking of fish and game have been changed by county boards of supervisors. While we realize that in some sections which are easy of access from the densely populated centers, it would seem to be the part of wisdom to shorten seasons, the method that has been followed could be greatly improved. The supervisors act under the authority that is found in section 25, subdivision 28 of the county government act, which provides that boards of supervisors in their respective counties have jurisdiction and power "to provide by ordinances not in conflict with the general laws of the State for the protection of fish and game, and *may shorten* the seasons for the taking or killing of fish and game within the dates fixed by the general State law, but *can not lengthen the same.*" We believe that the Board of Fish and Game Commissioners should be consulted whenever a change, however slight, from the state law, is contemplated. The Fish and Game Commissioners through their legal advisor, the Attorney General, could then prepare the ordinance, the terms and conditions of which should be mutually agreed upon, and in due course given approval by the supervisors in executive session. There should also be a time fixed when such action could be taken. This would give the Fish and Game Commissioners an opportunity to have these changes duly printed and distributed. Under existing conditions the laws are changed by county ordinances without consultation with the State Board of Fish and Game Commissioners, and no notification is given that any action has been taken, resulting in much confusion and frequently unintentional violations of county ordinances.

With respect to changes in the existing laws, we would recommend the following modifications:

Section 626*g*, relating to tree squirrels; opening the season on August 1st instead of September 1st, and eliminating the bag limit.

Amend section 626*a*, relating to doves, by changing the opening date from July 15th to August 1st, and extending it from October 15th to November 1st.

Amend section 626*k* to permit pheasants raised in captivity to be sold in the markets under proper restrictions.

Amend section 626*f*, relating to deer, by reducing the open season one month, beginning on the 1st day of August and closing October 15th.

Establish a close season of seven months on wild pigeons from the 1st day of January to the 1st day of August of each year, and fixing a bag limit of 20.

We respectfully recommend the following amendments to the laws regarding the taking or possession of fish, shrimp, etc.:

Amend section 628 by making it an offense for any person to take or have in his possession during any one calendar day more than five pounds of dried shrimp or shrimp shells of shrimp taken in the waters of this State.

Amend section 628, relating to crabs, by establishing a close season of two years on the taking or possession of any crabs (*Cancer magister*).

Amend section 628, relating to the sale of catfish, by defining a dressed catfish as one measuring not less than eight inches, exclusive of the head.

Amend section 628, as it refers to abalone taken in the waters of this State, by prohibiting the shipment of dried abalones or unmanufactured abalone shells out of the State, and permitting the capture and possession of red and green abalones measuring not less than sixteen inches in circumference, and black abalone not less than twelve inches in circumference—around the outer edge of the shell.

Amend section 628*a*, relating to striped bass, by prohibiting the exportation of any striped bass from the State of California.

Amend section 632, relating to trout, so that trout raised in captivity and measuring not less than seven inches in length may be sold in the markets between the 1st of April and the 1st of February of the year following, under restrictions to be recommended by the Board of Fish and Game Commissioners; also authorizing said Board of Fish and Game Commissioners to furnish at cost a reasonable number of trout eggs or ova to private individuals or companies who desire to engage in and carry on such an industry, when in the judgment of the said Commissioners a sufficient number of eggs has first been taken to meet the needs of the public waters of the State.

ACKNOWLEDGMENTS.

To you officially and personally we desire to express our sincere appreciation for the encouragement and practical assistance rendered to us in carrying on our work. You have given earnest and careful consideration to every measure recommended by us. We feel that through your efforts we are indebted largely for the hunting license law, which is the most important achievement in the interests of fish and game protection in the history of the State.

The Commission also desires to acknowledge its gratitude to the officers and subordinates of the following railway and transportation companies for courtesies extended to our men and for the uninterrupted and free transportation of eggs and fish—and so long as the statutes of this State permitted—free transportation for *all* of our employees:

The Southern Pacific Company; the Santa Fe Company; the Sierra Railway Company; to the California Northwestern Company; the Lake Tahoe Railway Transportation Company; the Nevada-California-Oregon Railway Company; the Boca and Loyalton Railway Company, and to the Pacific Coast Steamship Company. To Hon. George M. Bowers, United States Commissioner of Fisheries at Washington, D. C., and to his able assistants, Dr. H. M. Smith, Dr. B. W. Evermann, J. G. Dunlap, also Captain G. H. Lambson, superintendent of the salmon egg-collecting stations in California, we are under obligations for their cordial support and assistance in carrying on the fish cultural work. To Mr. A. Christeson, general manager of Wells, Fargo & Co., Mr. Thos. Woods, superintendent, Mr. J. C. Tice, and Mr. E. E. Honn, and in fact all the superintendents, agents and employees of that company, we are especially indebted for many privileges and unfailing courtesies. All requests have received respectful consideration, and in many instances voluntary assistance has been rendered that proved of great value to the State.

We desire also to extend our thanks to Mr. D. L. Bliss, Jr., superintendent of Lake Tahoe Railway and Transportation Company, for many courtesies and substantial assistance rendered in the free transportation of our men engaged in fish cultural work, and also the free handling of trout eggs and trout fry. To Messrs. Lawrence and Comstock, at Tallac, we are also indebted for the free use of teams for hauling fish, eggs, and supplies, and for many other privileges. To Washburn Brothers of Wawona our thanks are due for courtesies and assistance rendered our representatives and the free transportation of eggs, also the fry from the hatchery.

We are also indebted to Major W. W. Forsyth, acting superintendent of Yosemite National Park, for many courtesies and valuable assistance.

In submitting this report of the work accomplished, which practically covers a period of four years, we trust it will meet with your approval and that the recommendations made by us, which represent our best judgment, will be enacted into laws.

We have fully appreciated our responsibility in disbursing the large sums of money now at the disposal of this Commission, and have endeavored to expend it judiciously, and where in our opinion it would do the greatest good to the greatest number, always bearing in mind the possibility of a decrease in revenue, coupled with the fact that under the law the property under our control, valued at thousands of dollars, can not be insured. We have considered it a wise precaution to be prepared for any emergency as is shown by the balance in the state treasury at the close of the fiscal year, amounting to $73,318.21.

Yours respectfully,

F. W. VAN SICKLEN,
M. J. CONNELL,
W. G. HENSHAW,
Fish and Game Commissioners.

San Francisco, Cal., September 1, 1910.

APPENDIX.

TWENTY-FIRST BIENNIAL REPORT OF FISH AND GAME COMMISSION.

TWENTIETH BIENNIAL REPORT AND FINANCIAL STATEMENT
OF THE
STATE BOARD OF FISH COMMISSIONERS
FOR THE YEARS 1907-1908.

To the Hon. JAMES N. GILLETT, *Governor State of California.*

SIR: We have the honor to submit for your consideration, the following preliminary report as a brief record of the work and expenditures of this Commission covering the biennial period of the fifty-eighth and fifty-ninth fiscal years. Also the recommendations with respect to the changes in the fish and game laws of this State based upon our experience and close study of these important subjects, which we deem advisable.

For the purpose of comparison, we are submitting the financial statement for the fifty-sixth and fifty-seventh fiscal years to show the increase, both in resources and expenditures, also the decided increase in the number of arrests and total amount paid in fines over any other biennial period in the history of this Commission. This is due to the splendid results that have followed the establishment of a hunting license law, which in our opinion is the most popular law ever placed on our statute books. The returns on hunting licenses exceeded about four times the estimated number of the most sanguine.

Our full biennial report, which is now under compilation, will show more in detail the record of work performed at our different hatchery stations and other general work of the Commission.

FINANCIAL STATEMENT.

The resources and expenditures of this Commission have been as follows for the fifty-sixth and fifty-seventh fiscal years, ending June 30, 1906:

FIFTY-SIXTH FISCAL YEAR.

	Resources.	Disbursements.
Appropriation for support and maintenance of State hatcheries	$12,500 00	$12,500 00
Appropriation for restoration and preservation of fish	10,000 00	10,000 00
Appropriation for restoration and preservation of game	7,500 00	7,500 00
Steelhead Propagation Fund—		
Balance on hand July 1, 1904	625 33	
Drawn from fund during year		489 62
Balance on hand June 30, 1905		135 71
Game Preservation Fund—		
Balance on hand July 1, 1904	1,916 86	
Receipts from fines during the year	4,019 15	
Amounts drawn during year		4,620 55
Balance on hand July 30, 1905		1,315 46
Fish Commission Fund—		
Balance on hand July 1, 1904	7,325 52	
Receipts from licenses and fines	10,026 35	
Amount drawn from fund during year		12,377 57
Balance on hand June 30, 1905		4,974 30
Totals	$53,913 21	$53,913 21

	Resources.	Disbursements.
Appropriation for support and maintenance of State hatcheries	$12,500 00	$12,500 00
Appropriation for restoration and preservation of game	12,500 00	12,500 00
Appropriation for restoration and preservation of fish	10,000 00	10,000 00
Steelhead Propagation Fund—		
Balance on hand July 1, 1905	135 71	
Drawn from fund during year		135 71
Game Preservation Fund—		
Balance on hand July 1, 1905	1,315 46	
Receipts from fines during the year	5,295 89	
Amount drawn during year		4,888 80
Balance on hand June 30, 1906		1,722 55
Fish Commission Fund—		
Balance on hand July 1, 1905	4,974 30	
Receipts from licenses and fines	10,340 35	
Amount drawn from fund during year		10,255 54
Balance on hand June 30, 1906		5,059 11
Totals	$57,061 71	$57,061 71

Resources and expenditures of this Commission for the fifty-eighth and fifty-ninth fiscal years, ending June 30, 1908, were as follows:

FIFTY-EIGHTH FISCAL YEAR.

	Resources.	Disbursements.
Appropriation for support and maintenance of State hatcheries	$20,000 00	$20,000 00
Appropriation for restoration and preservation of game	10,000 00	10,000 00
Appropriation for restoration and preservation of fish	10,000 00	10,000 00
Game Preservation Fund—		
Balance on hand July 1, 1906	1,722 55	
Receipts during the year from fines	3,506 93	
Amount drawn during the year		3,532 31
Balance on hand June 30, 1907		1,697 17
Fish Commission Fund—		
Balance on hand July 1, 1906	5,059 11	
Receipts from fisherman's licenses	5,930 00	
Receipts from fines	4,039 23	
Amount drawn during the year		10,040 45
Balance on hand June 30, 1907		4,987 89
Totals	$60,257 82	$60,257 82

FIFTY-NINTH FISCAL YEAR.

Appropriation for support and maintenance of State hatcheries		$20,000 00	$20,000 00
Appropriation for restoration and preservation of game		10,000 00	10,000 00
Appropriation for restoration and preservation of fish		10,000 00	10,000 00
Game Preservation Fund—			
Balance on hand July 1, 1907		1,697 17	
Receipts during the year—			
From fines	$7,425 93	124,044 19	
From hunting licenses	116,579 11		
From sale of deer hides	39 15		
Amount drawn during year			46,641 70
Bounty on 287 California lions, October 15, 1907, to June 30, 1908			5,740 00
Balance on hand June 30, 1908			73,359 66
Fish Commission Fund—			
Balance on hand July 1, 1907		4,987 89	
Receipts from fisherman's licenses		3,784 10	
Receipts from fines		8,683 69	
Amount drawn during year			11,064 64
Balance on hand June 30, 1908			6,391 04
Fund for Fish Distribution Car—			
Appropriation		7,500 00	
Amount drawn during year			5,458 76
Balance on hand June 30, 1908			2,041 24
Fund for Fish Repository in Tuolumne County—			
Appropriation		500 00	
Amount drawn during year			299 95
Balance on hand June 30, 1908			200 05
Totals		$191,197 04	$191,197 04

The following comparative table is interesting, showing the increase in the number of arrests from year to year and the amount of fines imposed during each two years for the past twelve years:

Biennial period.	Violation of deer law.		Violation of quail law.		Violation of duck law.		Violation of salmon law.		Violation of striped bass law.		Illegally used nets seized and confiscated....	Total fines from all sources.
	No. of arrests.	Fines.	No. of arrests.	Fines.	No. of arrests.	Fines.	No. of arrests.	Fines.	No. of arrests.	Fines.		
1897-1898...	11	$100	7	$40	14	$220	19	$200	8	$100	30	$3,125 00
1899-1900...	37	735	3	350	6	220	18	900	47	805	23	5,779 00
1901-1902...	75	1,600	97	1,775	30	545	23	2,400	26	185	28	9,497 00
1903-1904...	135	2,035	109	2,344	30	375	15	1,040	69	1,340	47	11,738 00
1905-1906...	172	4,355	106	2,270	75	1,530	39	3,350	103	4,120	59	23,154 90
1907-1908...	196	5,230	102	2,337	63	1,124	27	2,900	153	5,401	85	30,122 25

We respectfully recommend the following amendments to the game laws:

Amend section 626 by making the open season for valley quail, rail, snipe, curlew, ibis, plover, or other shore birds to commence with the duck law on October 1st instead of October 15th, and close the season for ducks and these other birds on February 1st instead of February 15th, except the Wilson snipe.

We also recommend that a close season of two years be established on mountain quail and grouse or sage hen.

Amend section 626*c* by adding to the list of game birds protected at all times, the wild turkey, which is now being imported into this State.

Amend section 626*d* by reducing the bag limit on ducks from thirty-five to twenty-five, also to include black sea brant and to reduce the bag limit of quail, doves, snipe, curlew, ibis, plover, rail, or other shore birds from twenty-five to twenty.

We would also recommend that a law be enacted to prohibit the use of any trained animals or live blind to use as a means of approach for the purpose of killing any wild ducks or other waterfowl.

We also recommend the present hunting license be amended to include fishing or angling, the amount to remain the same, and to be used for both, or either, hunting or fishing, and the money derived from such hunting license sales be paid into one fund to be known as the fish and game preservation fund, into which fund the unexpended balances remaining in the fish commission fund and game preservation fund, respectively, shall be merged.

We recommend the following amendments to the fish laws:

Amend section 628, relating to crabs, by raising the present close season September and October, and establishing in lieu thereof a close season of four months beginning November 1st and ending February 28th. And to establish a close season for at least two years on lobster or crawfish.

Amend section 628*a*, relating to striped bass, by establishing a close season of six weeks from the 1st day of May to the 15th day of June, during which time (the principal spawning season of these fish) their capture by nets and seines shall be prohibited.

Amend section 632½, referring to steelhead trout, by removing the close season that existed during the months of September and October, and to open the season for the capture of steelhead trout in all waters of the State April 1st, and to extend to February 1st the following year.

Amend section 634 by reducing the mesh of net at which salmon can be taken from 7½ to 6½ inches, and reduce the mesh of net by which striped bass and shad can be taken to 5½ inches.

Amend section 636 by striking out the word "set" and substituting the word "use."

Amend the act of 1887, March 21st, referring to the vocation of fishing by reducing the amount of license fee to a citizen of the United States from $5.00 to $2.50 and raising the fee to any person not a citizen of the United States to $10.

We append herewith an additional statement of the condition of the game preservation fund, showing the amount remaining in this fund on February 1, 1909, from the sale of hunting licenses and fines collected, together with our estimate of expenses for game preservation to the close of the fiscal year, June 30, 1909.

Amount in license fund February 1, 1909		$106,276 00
Amount received for fines since July 1, 1908		4,161 00
		$110,437 00
Estimate of expenses of the Commission for game preservation for the next five months:		
Salary and expenses of 62 deputies and assistants, $7,560 per month	$37,800 00	
For rewards in conviction cases paid outside deputies, monthly average $450	2,250 00	
Expenses of Game Farm, monthly average $300	1,500 00	
Incidentals, including office rent, expressage, license tags, telephone, and telegraph, fuel for launches, cost of prosecutions in justice and superior courts, postage, stationery, etc., monthly average $660	3,300 00	
Repair and maintenance of car	500 00	
Bounty on lions per month, $600	3,000 00	
Hungarian partridges and pheasants (contracted for)	3,000 00	
Trapping and distributing quail and procuring and importing wild turkeys	4,000 00	
Proposed expenditures for Hungarian partridges	5,000 00	
		60,350 00
Balance		$50,087 00

N. B.—It should be borne in mind that it will be four months after the end of the present fiscal year, during which time no license money will be available and the average monthly expense of about $12,000—or, say, $48,000—must be provided for from our surplus. Also payment for cottage at Game Farm, amounting to $1,750, now being built under contract.

Respectfully submitted.

GEORGE STONE,
F. W. VAN SICKLEN,
M. J. CONNELL,
Board of Fish Commissioners.

REPORT ON RECEIPTS AND DISBURSEMENTS OF FISH AND GAME COMMISSION, TWO YEARS ENDING JUNE 30, 1910.

By Price, Waterhouse & Co., Chartered Accountants.

San Francisco, September 15, 1910.

California Fish and Game Commission, San Francisco, Cal.

Dear Sirs: In accordance with your instructions, we have made an examination of the books and accounts of the California Fish and Game Commission for the two years ending June 30, 1910, and we attach hereto the following schedules:

Statement of receipts and disbursements, year ending June 30, 1909, Exhibit "A."

Statement of receipts and disbursements, year ending June 30, 1910, Exhibit "B."

From the statements submitted it will be seen that the accounts have materially changed since July 1, 1908, inasmuch as the funds for the restoration and preservation of game and the restoration and preservation of fish have been discontinued altogether, and the game preservation fund and the fish commission fund have been merged into a fund called "Fish and Game Preservation Fund," which was created and approved on March 15, 1909.

For the year ending June 30, 1909, the fish and game preservation fund received credit for the sum of $136,064.84 from hunting and fishing licenses, fines and fish eggs sold to the German Government. In addition the following appropriations were made by the legislature:

Support and maintenance of hatcheries	$20,000 00
Restoration and preservation of game	10,000 00
Restoration and preservation of fish	10,000 00
	$40,000 00

For the year ending June 30, 1910, there was only one appropriation made of $20,000.00 for the support and maintenance of hatcheries, which fund also received credit for the receipts from fishing licenses sold, which amounted to $21,982.50.

We have limited our examination, in so far as the records of the two years above referred to are concerned, to the checking of all disbursements by the Chief Deputy, and to see that all hunting and fishing licenses issued for the year ending June 30, 1910, have been properly accounted for. Regarding the disbursements by the Chief Deputy we have seen vouchers or other acknowledgments for all, with the exception of two small disbursements amounting to $11.88. As no complete classification of the disbursements has been made, we are unable to make such a classification now, but we will outline a system which will provide for this in the future.

We have seen that all receipts from the sale of hunting licenses for the year ending June 30, 1910, have been properly recorded and accounted for to the State Treasurer, and we have seen acknowledgments from the State Controller stating that all fishing licenses for the two years which remained unsold have been properly returned to him. We have also seen a letter from the State Controller which verified the balances in the treasury at June 30, 1910.

The value of the hunting licenses printed for the season 1909–10 was			$165,750 00
which is accounted for as follows:			
Cash receipts during year		$126,734 35	
Less:			
Amounts applying to prior year:			
1909.			
July 6—Marin County	$905 00		
6—San Francisco County	1 00		
9—Siskiyou County	3 00		
12—Tehama County	2 00		
15—San Francisco office	2,338 25		
28—Amador County	2 00		
29—Alameda County	100 00		
Aug. 9—Modoc County	113 00		
21—Tuolumne County	10 00		
Dec. 21—Merced County	15 00		
		3,480 25	
			$123,254 10
Add:			
Amounts collected since June 30, 1910, applying on year 1909–10:			
1910.			
July 5—Riverside County	$1 00		
6—San Francisco office	2,221 00		
8—Imperial County	44 50		
12—San Mateo County	125 00		
15—Madera County	167 60		
15—San Benito County	1,060 00		
23—Sonoma County	576 00		
25—Inyo County	16 00		
25—Placer County	986 00		
		5,197 10	
		$128,451 20	
Unsold licenses, duplicates, etc.		37,259 00	
Express charges on remittances from county clerks to Sacramento		83 80	
Licenses still owed for by Inyo county clerk (5 at $10.00)		50 00	
		$165,844 00	
Less:			
Amount overpaid by San Diego County	$85 00		
$1.00 license changed to $10.00—Shasta County	9 00		
		94 00	
			$165,750 00

In addition to the work done by us on the accounts for the past two years, we have also checked the following on account of the present year 1910-11:

Hunting licenses printed by the Union Lithograph Company as follows:

Aliens, 500 at $25.00	$12,500 00
Nonresident citizens, 500 at $10.00	5,000 00
Resident citizens, 135,000 at $1.00	135,000 00
	$152,500 00

At the time of our audit, August 24th, the following had been issued:

	Alien.	Non-resident.	Resident.	Value.
San Francisco office	25	10	4,200	$4,925 00
Firms, etc.			5,350	5,350 00
Los Angeles office	5	5	2,500	2,675 00
Fresno office			200	200 00
A. F. Lea			50	50 00
Harry Warr			50	50 00
County clerks	305	300	113,900	124,525 00
	335	315	126,250	$137,775 00
Leaving unissued	165	185	8,750	14,725 00
	500	500	135,000	$152,500 00

We counted all the licenses which were unissued and those unsold in the San Francisco office, and we saw receipts for all licenses issued to county clerks, etc., with the exception of Inyo County, for 5 aliens, 10 nonresidents, and 1,000 residents' licenses forwarded on June 3, 1910. We found on August 24, 1910, that the San Francisco office had collected for—

Licenses sold		$9,535 00
Which was accounted for as follows:		
Mercantile National Bank, San Francisco (per certificate)	$9,436 45	
Cash on hand	23 55	
Checks on hand	24 00	
Board of health licenses issued	26 00	
Express charges on coin from Sacramento	14 20	
Sundry vouchers	15 75	
		9,539 95
Over		$4 95
Being:		
Unlocated difference	$2 00	
Interest on bank balance	4 60	
	$6 60	
Less:		
Bank collection charge	1 65	
		$4 95

It will be seen from the above that a small amount of the license sales has been withheld in order to pay for express charges and certain small items of expense which require immediate payment. We consider that all cash received from the sale of licenses should be deposited daily, and that a fund of say $100.00, or $250.00 if necessary, should be created, out of which all such disbursements can be made.

We notice that hunting licenses are printed by the Union Lithograph Company, in whose possession the dies for these licenses, we presume, are still held. It would seem to us to be an easy matter to get an additional lot of these licenses printed, and to any one in the San Francisco office who is familiar with the sale of such licenses they could be sold and the funds never reach the hands of the Commissioners. We think that the hunting licenses should come through the State Controller's office in the same manner as the fishing licenses. This would eliminate practically all chance of getting additional licenses printed.

The following amount of fishing licenses were received from the State Controller for the year 1910-11:

2,000 aliens at $10.00	$20,000 00
2,000 citizens at $2.50	5,000 00
	$25,000 00

At August 24, 1910, we found that of this amount the following had been sold:

1,274 aliens at $10.00		$12,740 00
1,088 citizens at $2.50		2,720 00
		$15,460 00
Which was accounted for by:		
Bank of California certificate	$10,457 50	
Remittances to State Treasurer August 9, 1910	5,000 00	
Cash on hand	2 50	
		$15,460 00

The licenses unsold in the San Francisco office were counted and found in order, and the licenses in hands of deputies were all verified by letters from the various deputies.

While the fishing licenses expire on March 31st of each year, the receipts from license sales have been considered as revenue applying on the following fiscal year ending June 30th.

We find that there are approximately $40,000.00 receipts from sale of licenses and $120,000.00 disbursements passing through the hands of the Chief Deputy annually, and that the only bond given by any one is for $2,000.00, from the president of the Board of Fish and Game Commissioners. This would appear to us to be entirely inadequate, and we would suggest that provision should be made for the bonding of the Chief Deputy and his cashier.

We have not checked any disbursements which have been made directly through the State Treasurer, as we understand that such vouchers have all been passed by a Board of Examiners and also the State Controller's office.

We shall be pleased to give you any further information which you may desire.

Yours very truly,

PRICE, WATERHOUSE & CO.,
Chartered Accountants.

EXHIBIT "A."

California Fish and Game Commission, Statement of Receipts and Disbursements Year Ending June 30, 1910.

Showing game preservation fund and fish commission fund combined (*law changed March 15, 1909*).

Game preservation fund. }
Fish commission fund. } *Fish and game preservation fund:*

Balance in hands of State Treasurer, July 1, 1908		$79,750 70
Less:		
June, 1908, expenditures		7,477 70
		$72,273 00
Receipts:		
Hunting licenses	$113,476 93	
Fishing licenses	6,647 50	
Fines	15,565 41	
Fish eggs sold	375 00	
		136,064 84
		$208,337 84
Disbursements:		
State Treasurer	$19,126 99	
Chief Deputy	112,557 83	
		131,684 82
Balance June 30, 1909		$76,653 02
Being:		
In hands of State Treasurer	$87,444 85	
Less:		
June, 1909, expenditures	10,791 83	
		$76,653 02
Support and maintenance of hatcheries fund:		
Appropriation for year	$20,000 00	
Disbursements by State Treasurer		$20,000 00
Restoration and preservation of game:		
Appropriation for year	$10,000 00	
Disbursements by State Treasurer		$10,000 00
Restoration and preservation of fish:		
Appropriation for year	$10,000 00	
Disbursements by State Treasurer		$10,000 00
Fund for fish repository in Tuolumne County:		
Balance July 1, 1908 (no change)		$200 05

EXHIBIT "B."

California Fish and Game Commission, Statement of Receipts and Disbursements Year Ending June 30, 1910.

Fish and game preservation fund:		
Balance July 1, 1909		$76,653 02
Receipts:		
Hunting licenses	$126,734 35	
Fines	19,789 27	
Game Farm earnings	938 22	
		147,461 84
		$224,114 86
Disbursements:		
State Treasurer	$38,163 71	
Chief Deputy	112,632 94	
		150,796 65
Balance June 30, 1910		$73,318 21
Being:		
In hands of State Treasurer	$89,275 04	
Less:		
June, 1910, expenditures	15,956 83	
	$73,318 21	
Support and maintenance of hatcheries fund:		
Appropriation for year		$20,000 00
Receipts—Fishing licenses		21.982 50
		$41,982 50
Disbursements:		
State Treasurer	$32,302 75	
Chief Deputy	9,679 75	
		$41,982 50

REPORTS OF SUPERINTENDENT OF SISSON HATCHERY, SEASONS 1908 AND 1909.

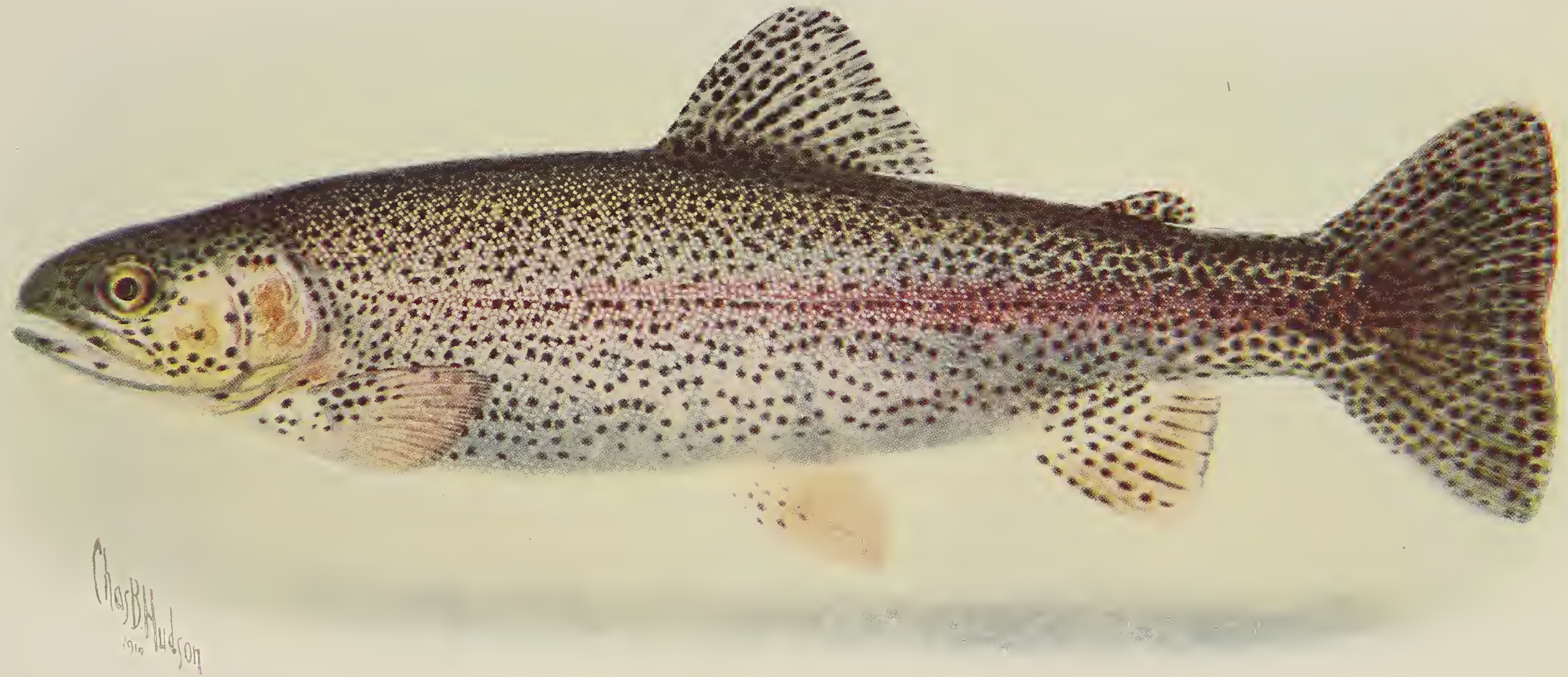
SISSON, CAL., November 30, 1908.

Honorable Board of Fish Commissioners, for the State of California.

GENTLEMEN: In accordance with the instructions of your honorable Board, I herewith submit a brief report of the work done at Sisson Station during the years 1907–1908. It is with pleasure that I can report the station in a prosperous condition—due in a great measure to the able support given to me by your honorable Board and Chief Deputy. I will endeavor to outline the principal work that has been done at this station in the last two years. During the period since my last report the necessary repairs have been kept up, new ponds constructed, a pumping plant for irrigating the grounds and for washing the ponds with water under pressure (through a hose and nozzle), the erection of a poacher proof fence around the grounds, the construction of a new hatchery for salmon work, the building of a raceway below the ponds, are among the main improvements.

The electric lighting plant has been enlarged by the installation of a new dynamo, and a new set of carbonized troughs has been set up in the hatchery "C." The source of our water supply has been changed to a point lower down on Spring Creek. When the Commission purchased the "Watson Tract" of land a water right and ditch went with it. The head of this ditch was in Spring Creek, a couple of hundred yards below the head of the old canal. The ground slopes on an even incline toward the hatchery, and the two ditches approach each other until they are parallel at a point a quarter of a mile from the hatchery. There we turned the lower ditch into the old canal. This was done to secure a steadier flow of water. At the source of the old canal are two other ditches that all have their source in the same dam, and as the flow was increased or decreased by the owners of these ditches, it caused us more or less trouble at the hatcheries, as we must have a steady flow of water. This change did not interfere with the flow of water in the old ditch or canal. The same amount has been in use at this station for the past seven years.

Several of the ponds were changed and new ones built to accommodate our increasing stock of brood fish. We now have at this station 45 ponds and four hatcheries for the rearing of fish. The hatcheries contain 300 troughs that are in almost constant use. A team of horses



RAINBOW TROUT (Salmo irideus)

DRAWN FROM CAPTIVE FEMALE FISH 11 3-4 INCHES LONG

and wagons have been purchased, and they have proved to be an economical investment. In the fall of 1907 we erected the fourth hatchery, "D," as we did not have room enough to handle the extra number of trout eggs that we were expecting to take, along with the salmon eggs. A building 50 by 75 feet was put up over one of the salmon batteries. It is a plain, substantial structure, with a corrugated iron roof. It is fitted up with the old troughs used in the salmon battery, and has been in use ever since it was built. Hatchery "A," the first building erected on the Sisson Hatchery grounds in the fall of 1888, is now in an unsafe condition. The foundation, sills, and floor are badly rotted, and the tank and wall on the north side are in the same condition. I would respectfully recommend that a new hatchery be built on a larger and more modern plan this coming season. The building is not safe any longer. We have repaired it several times in the last ten years. It is now in a state of decay beyond any repairs that are practical. In its place should be erected a modern building, fitted up with the latest and more improved system of hatching and rearing troughs.

The output of fry from Sisson Hatchery, for the years 1907–1908 is as follows:

1907.

Salmon fry	63,697,000
Steelhead trout fry	135,000
Rainbow trout fry	2,003,000
Eastern brook trout fry	826,000
Loch Leven trout fry	268,000
Sunfish	1,000
Rainbow eggs sent to the Philippines	25,000
	66,955,000

1908.

Rainbow trout fry	3,440,000
Eastern brook trout fry	1,780,000
Loch Leven trout fry	540,000
Steelhead trout fry	170,000
Total trout fry	5,930,000
Salmon fry	54,465,000
	60,395,000
Making a grand total for the two years of	127,349,000

In the spring of 1907 it was decided that the California Fish Commission and the Federal Bureau of Fisheries should coöperate in the work of collecting eggs on the Shasta River. A site was selected at the dam of the Siskiyou Electric Power Company, four miles from Yreka, Siskiyou County, as the place was favorable for a good take of eggs whenever there was a normal flow of water in the river, but, like all streams, when there is a flood it makes it difficult to operate a trap. The object of this station was to secure eggs from wild fish to improve the stock of fish in the ponds, both in the Eastern States and at Sisson Hatchery. On account of the season being late and the stream unusually high, only a small lot were taken. Three hundred and seven thousand of the eggs were sent to Eastern hatcheries by the Federal Bureau of Fisheries. In the spring of 1908 Shovel Creek Station of the California Fish Commission, an auxiliary of the Sisson Hatchery since 1890, was opened for the purpose of collecting rainbow trout eggs. This station had not been in operation for several years, as we had as many eggs from the ponds as our time and funds would allow us to collect and distribute. But with the prospects of a distributing car that the last legislature had provided for, we determined to increase our output by operating Shovel Creek Station.

We collected 1,350,000 rainbow eggs. Ten per cent of these were hatched at Shovel Creek Station and distributed in the creek above the hatchery. This was done to keep up the supply of fish in this, one of the finest streams for large spawning fish on the coast. Two hundred and fifty thousand eggs were sent to Germany at the request of the United States Bureau of Fisheries, and the remainder, 965,000, less the loss in eyeing, were shipped to Sisson. We again operated on the Shasta river in the winter and spring of 1908, and collected 836,000 eggs. The percentage of fertilization was small, owing to certain conditions that could not be avoided at the time. The Bureau of Fisheries took their share, 300,000, and shipped them to their different hatcheries on this coast and in the East. Since the distributing car was put in use this summer the fry have been held longer, and consequently they were larger than usual this season. During the latter part of the shipping season the fry averaged from 2½ to 3½ inches in length. This is as large as they can be successfully handled. The car greatly facilitated the work. It carried the fish in better condition than the old way of using dippers and cans, and allowed us to distribute a great many more fish than could have been done under the old system.

We can now increase our pond system and distribute more fry each season, so that every section of the State can be supplied. The pond fish have thrived and furnished the hatcheries with good eggs, cheaper than they could be collected from wild fish. By getting the eggs from the pond fish, we are insured of a never-failing supply of eggs without disturbing the fish in their natural state. The number of fish in the ponds at Sisson Hatchery December 1, 1908, are as follows:

Adult Eastern brook trout	5,300
Two-year-old Eastern brook trout	4,000
Yearlings	2,000
Fry	20,000
Total Eastern brook trout	31,300
Adult rainbow trout	11,150
Two-year-old rainbow trout	6,000
Yearlings	5,000
Fry	50,000
Total rainbow trout	72,150
Adult Loch Leven trout	4,000
Two-year-old Loch Leven trout	1,200
Yearlings	1,000
Fry	15,000
Total Loch Leven trout	21,200
Sunfish	3,000
Eighteen-months-old grayling	900
Adult steelhead trout	200
	10,000
	14,100
A total of all varieties	138,750

We have deposited a larger number of fry in the nurseries this season than usual, as we desire to select from them a strong, healthy stock of breeders. So far we have not heard of any results of the grayling fry distributed in the streams of this county. I have not had the time to make a personal investigation of the streams in which they were planted, but inquiry has failed to find any one who has seen or caught one. Probably we shall find them this coming season. They were planted in streams where they should thrive. Those in the ponds appear to be in good condition, and if we can keep them free from disease until they are old enough to breed, I am of the opinion that we will be able to get them introduced into our mountain streams.

It has been several years since we have had any Eastern brook trout eggs from wild stock, and I think that it would be advisable to get a small shipment from one of the Eastern stations, if the same can be procured, to improve our stock of pond fish. Eggs from wild Eastern trout can be gotten in this State another season, or from some of the lakes in Nevada.

The stock of Loch Leven trout that have been at this station for twelve years past have not degenerated, and those in the ponds appear to be as strong and vigorous now as was the original stock when they were first brought here. Like all other species of trout, they are subject to various diseases, but domestication and artificial food do not appear to change their condition.

The rainbow trout in our ponds are in good condition and show no signs of degeneracy. The only noticeable feature of the rainbow trout that has decended for several generations of pond fish is the increasing brightness in their colors and a changed appearance of their spots. Considerable could be written on this subject, but time and a closer study are necessary before going deeper into it. This is a study that will interest the ichthyologists and will be given more attention from now on.

In closing this brief report on the work of this station I beg to say that the encouragement and advice given to me by your honorable Board and Chief Deputy has greatly assisted me in making the work of this station a success.

Respectfully submitted.

[Signed.] W. H. SHEBLEY,
Superintendent Sisson Hatchery.

SISSON, CAL., September 1, 1910.

Honorable Board of Fish and Game Commissioners for the State of California.

GENTLEMEN: The Superintendent of the Sisson Hatchery submits the following report of the work and operations at Sisson Station for the years 1909-1910, up to September 1st.

The most important work during the last two years has been the construction of a new hatchery building, a cottage for the use of the foreman, a new feed house, wagon shed, a shed over the salmon rearing troughs, new flume and tanks at Shovel Creek Station; the building of a cabin, racks, and trap at Bogus Creek egg-collecting station; the removal of the pond keeper's cottage from the upper to the lower end of the hatchery grounds; the building of a new road and walk from the main hatchery (A) to the county road; the placing of redwood troughs in hatcheries "C" and "D," and the improvement in the pond work and the increase in the number of fish raised during the last two seasons.

After your honorable Board had approved the recommendations mentioned in the report of 1908 for the construction of a new hatchery to take the place of hatchery "A" that had been constructed in 1888, and was in such a state of decay that further attempts to repair it were useless, I submitted a plan of a hatchery 145 feet in length and 42 feet in width, to contain 100 hatching troughs, office, laboratory, also rooms for the men upstairs, storage rooms for tools, apparatus, etc.

The plan of the new hatchery was on entirely new lines, being similar to the plan I made for you two years ago for the Tallac Hatchery; that is, in regard to the arrangements of the troughs. The new system gives each trough a supply of pure water direct from the distributing tank. The troughs are arranged in sections of two each, placed side by side. There is an aisle between each section, and the main aisle or passageway is in the center of the building instead of on the sides, as in the arrangements of the old style of buildings.

The new hatchery was well built, all of the material used in its construction being selected stock. The lumber was selected for its durability and strength. The lumber in the troughs was all selected from heart red fir logs, and will last for years.

The building is well proportioned and on good architectural lines. The work of razing the old hatchery building was begun in the latter part of August, 1909. After the removal of the old building, and the foundation of the new one had been laid, the work was delayed for nearly three weeks on account of the serious illness of a member of the superintendent's family. Owing to the nearness of the dwelling to the hatchery site, the least noise would have been serious.

The rainy season began in the latter part of September, unusually early, and continued until December 1st. The work on the new hatchery was necessarily slow. The interior of the building had to be arranged first, and as much of it finished as possible, so as to have a place to hatch the trout eggs that were coming on during November and December.

During December and January the ground was covered with snow, and when the weather was not blustering and sleeting it was very cold, freezing the lumber whenever it happened to be damp and making it difficult to carry on the work. The men worked patiently under the prevailing conditions and finished the more important part of the work during the latter part of January. The new cottage was constructed during the same time. The old one (pond keeper's cottage) was removed early in the fall to the lower part of the grounds, so that the new one could be erected on the same site. The new cottage is well built, the material being selected for durability. The plan of this cottage was the same as the plan of the superintendent's cottage at the State Game Farm. It has five rooms, laundry, bath, fireplace and other modern conveniences.

We used the troughs taken from the old hatchery, that is, those that were not too much decayed, to make a battery of salmon rearing troughs. The iron roofing from the old hatchery was used to make a shed over these troughs. This battery was built to make more room for the salmon embryos, so as to relieve hatcheries "C" and "D."

Hatchery "A," the new building, will be used exclusively for the hatching and rearing of trout, particularly the eyeing of the eggs will be done in this building, as it can be kept in better condition than the buildings with the old style of boxes.

During the summer and fall of 1909, the troughs in hatcheries ''C'' and ''D,'' having been made out of soft timber, became very spongy, except a few that were carbonized a couple of years before, and it was deemed best to remove them, as the fry could not be kept healthy in troughs made from such material. I recommended that the troughs be changed and better ones substituted. My recommendation was approved by your honorable Board. After the salmon fry had been released, I tried to get selected lumber from the mills here, but as it was early in the spring there was not any chance to get the material necessary here, and redwood lumber was used.

We built 130 new troughs and put them into hatcheries ''C'' and ''D.'' Ninety were put into ''C'' and 40 into ''D.'' The other troughs in ''D'' were in good order.

In June, 1910, we built a straight road from the entrance to the hatchery grounds to the county road opposite, a distance of 630 feet. A sidewalk was also built of plank running parallel to it for the convenience of pedestrians.

The Sisson Tavern Company removed one of their barns, so that the Commission could build the road and walk straight from the hatchery to the county road. Owing to the uncertainty of getting rainbow eggs from the Shasta River Station, on account of the tremendous floods that came down that stream every spring, I determined to put in a rack and trap in Bogus Creek, four miles north of Thrall, on the line of the Klamath Lake Railroad. I had examined this creek years ago for the purpose of collecting rainbow trout eggs, but, owing to the almost impassable trail that leads down that canyon, I gave the plan up until after the construction of the Klamath Lake Railroad. In January, 1910, I ordered the material for a rack and trap, had it framed at Sisson, and shipped to Bogus Creek, where Mr. A. E. Doney, with the necessary number of assistants, put them in place.

We also put up a small cabin for the men. Mr. Doney successfully handled the trap and other work connected with the station. We secured a lease for the privilege of operating on the creek and land enough for the tanks and cabin. The lease gives the Commission the privilege of operating an egg-collecting station each season for the period of ten years, the station to be closed each season by April 1st.

This is late enough, for the spawning season on the Klamath River and its tributaries is practically over. The work of carrying the eggs from the canyon where the trap is located to the railroad bridge was very hard work. After the eggs were brought to the railroad track they had to be taken on a hand car to Thrall, where they were transferred to the Southern Pacific Railroad, and then taken to Sisson.

The operations at this station were very successful. There were collected 2,000,000 fine rainbow trout eggs. The fertilization was good. Mr. Requa spawned the fish and cared for the eggs en route to Sisson.

Shovel Creek Station furnished 1,100,000 eggs. A larger number of eggs would have been taken, but a rise of water in the creek, which ran over the racks, allowed a great many fish to escape. Ten per cent of the eggs taken at Shovel Creek were hatched there, and the fry distributed in the creek. We took 5,000,000 eggs from the pond fish. This was the largest number of eggs taken from the pond fish since the pond work was begun. These, with the eggs from the Klamath River stations, gave us a total of 8,000,000 rainbow trout eggs for the season. They were hatched in good condition, and the fry show the benefit of the new arrangement of the troughs. Taking them as a whole, they are the finest lot of fish that were ever handled at this station.

The output of salmon fry for the season of 1909–1910 was lighter than it has been for several years past, owing to high water in the rivers and streams tributary to the Sacramento River, on which the United States Bureau of Fisheries stations are located. The high water washed out the racks and a large number of spawning salmon escaped. This caused the take of salmon eggs to be short for this season. We received 22,500,000 as the total take of the season. These were given extra care during the hatching period, and the fry were liberated under the most favorable conditions.

They will give better results than a larger number of eggs would if not handled so systematically. We have built a couple of new ponds in the last two years, making a total of forty-seven ponds and nurseries on the grounds.

The total number of fish on hand in the ponds at Sisson Station September 1, 1910, is as follows:

Rainbow trout:	
Adults	11,000
Two years old	2,000
One year old	8,000
Fry	40,000
Total	61,000

Eastern brook trout:	
Adults	7,000
Two years old	1,000
One year old	3,000
Fry	25,000
Total	36,000

Loch Leven trout:	
Adults	4,500
Two years old	1,300
One year old	8,000
Fry	20,000
Total	33,800
Adult grayling	100
Adult golden rainbow	20
Adult land-locked salmon	25
Adult sunfish	200
Two-year-old steelhead	100
Steelhead fry	10,000
Salmo mykiss fry	10,000
Golden rainbow fry	250
Total	20,695
	157,495

The number of fry distributed during the season of 1909 from Sisson Station is as follows:

Salmon fry	22,500,000
Rainbow trout fry	3,083,500
Eastern brook fry	1,220,000
Loch Leven fry	955,000
Steelhead fry	168,000
Total	27,926,500

The distribution of trout for the season of 1910 will reach about 8,000,000. The work of distribution is going on very successfully. The fry are in excellent condition and carry well. Owing to the drought it will be late in the season before the shipping is over. There is a scarcity of water in a great many streams, and the applicants will have to wait until the rain season begins before the fish can be distributed. It is too early to make any forecast as to the number of eggs expected from the salmon run this fall and winter. It depends on the weather—if sufficient rain should fall before the middle or twentieth of October, we can expect a good take of eggs at the Bureau of Fisheries stations.

The trout fry hatched at Sisson Station this season, of which a number are distributed, is as follows:

Rainbow	5,205,000
Eastern brook	1,000,000
Loch Leven	1,484,000
Steelhead	303,000
Salmo mykiss	150,000
Total	8,142,000
Rainbow eggs hatched at Shovel Creek	120,000
Grand total	8,262,000
Eggs shipped to other stations from Sisson, to be deducted from total—to Brookdale	25,000
Eggs shipped to other stations from Sisson, to be deducted from total—to Wawona	50,000
	75,000

Our next work was to get the seining ground in shape, which was done, and we commenced operations with the seine on the night of April 8th and continued until May 27th, with ranging success. The weather during that period was very favorable for our work. We caught 5,045 trout (males, 2,284; females, 2,761). The males averaged about 1¾ and the females 1½ pounds in weight. Number of females spawned, 2,700, averaging nearly 1,600 eggs to the fish. The total number of eggs taken for the season was 4,115,000. Shipped 400,000 eggs away from the lake—Wawona receiving 250,000, Morrill and Denton, Verdi, Nev., 150,000. The latter was given in exchange for rainbow eggs and Eastern brook trout fry, which were planted in the streams and small lakes in this vicinity. The work of distributing the fry at the different stations was taken up in July and continued until all were planted. Nearly all of the mountain lakes in this vicinity were stocked, and good reports have been received. Received instructions to close the stations as soon as the distribution was over. Glen Alpine was closed August 7th; Tallac, September 24th, and Tahoe on October 10th, so that the necessary improvements could be made at this station (Tahoe Hatchery) before the stormy weather set in. Mr. Matt Green was employed to renew the foundations for hatchery and cottage, and to cover the outside of the buildings with rough rustic and stain the same, and also build new porches. This work was completed on November 8th, and Mr. Green and crew moved to Tallac to build a four-room cottage for the attendants at the Tallac Hatchery. This work was completed during the early winter. I reported in the office at San Francisco, took a vacation, and was ordered to report to Mr. W. H. Shebley, superintendent Sisson Hatchery, which I did, arriving there on December 8th and remained during the winter months.

Season 1910.—Received instructions from your honorable Board on March 10th to start from Sisson for Tahoe to open the stations for the season of 1910; arrived in San Francisco on March 11th and proceeded to Tahoe on March 12th, arriving there on the evening of March 14th. Upon my arrival in Truckee I found that the Lake Tahoe Railway and Transportation Company people had their road open, so it made it much easier to reach the lake than last year. My assistants, Messrs. Anderson, Calkins, West and Shaw, were in Truckee and joined me on the trip. March 15th visited the hatchery, and found everything in good shape and very little snow for this time of year. Crew started for Tallac to place hatchery in order and commence operations with the seine March 16th. Inspected the buildings and found everything in good order, also that Mr. Green had built a very neat cottage for the attendants.

March 17th to 26th: Routine work, getting things in shape at the hatchery and seining ground; also building new bulkhead at the mouth

In the work of construction at Sisson Hatchery, Chief Deputy Vogelsang greatly assisted me in furnishing practical ideas in regard to the color schemes in painting and other valuable suggestions. His untiring zeal has in a great measure helped me to make Sisson Station one of the most successful fish cultural stations in the United States. We are now prepared to carry on successfully the most modern and improved methods of fish cultural work. The kindly appreciation of my work by your honorable Board has been fully realized. It has encouraged me to do my very best for the interests of the Commission and the State.

Respectfully submitted.

W. H. SHEBLEY,
Superintendent Sisson Station.

REPORT OF SUPERINTENDENT TAHOE HATCHERIES.

YEARS 1908-1909.

To the Honorable the Board of Fish and Game Commissioners.

Gentlemen: I herewith submit by detailed report of the work covering the seasons of 1909 and 1910.

Acting under instructions from your honorable Board, I started for Tahoe on March 5, 1909, to open the stations for the spring and summer work. March 6th arrived in Truckee with my assistants, Messrs. Anderson, Calkins, West, and Shaw. We proceeded to Tahoe City in sleighs, making the trip in seven hours. The road was in very bad shape and we had to walk several miles. Encountered snow from three to twelve feet deep en route.

March 7th I inspected the Tahoe Hatchery and buildings; found everything in good shape.

March 8th I started for Tallac with my crew to complete the interior of the new hatchery that was built during the latter part of the season of 1908, and to place the seining ground in shape to commence operations with the seine. The new hatchery building was erected for the State by Messrs. Lawrence and Comstock of Tallac, and the setting of the troughs and some unfinished outside work was done under contract by Mr. Matt Green. The building is a very substantial one. It is forty feet wide by seventy feet long, with a half pitch roof, and is covered on all sides with shingles, giving it a neat and attractive appearance. It has forty troughs, with hatching capacity for about three million eggs. It is supplied with water from Taylor Creek. A concrete dam was built on Taylor Creek some nine hundred feet from the building. The water is conveyed from that point to the hatchery in an eight-inch iron pipe, which is laid under ground practically all of the way.

of Taylor Creek to facilitate the seining. March 27th commenced operations with seine and continued until May 8th, with grand success. The present season has been the banner season in egg-collecting on Lake Tahoe in the history of the California Fish and Game Commission, as the following results will show: Number of fish caught, 7,250 (males, 2,981; females, 4,342); males averaging nearly 2 pounds and females 1½ pounds. Number of females spawned 4,194, they averaging about 1,500 eggs to the fish. Total number of eggs taken 6,130,000, of which 1,680,000 were shipped to the following State hatcheries: Sisson, 100,000; Wawona, 250,000; Ukiah, 400,000; Marin County, 100,000, and 830,000 exchanged with Morrill and Denton of Verdi, Nev., for Eastern brook trout fingerlings.

Our best spawning day was on May 7th, when we collected 965,000 eggs. We had several days during our spawn collecting seasons that over half million eggs were taken. The number of eggs hatched at the Tahoe stations this season will be about 4,000,000, distributed and hatched as follows: Tallac Hatchery, 2,250,000; Tahoe Hatchery, 1,050,000; Glen Alpine, 700,000; have been distributing fry from the Tallac and Glen Alpine stations for the past week to relieve the crowded condition of the troughs. The work of distribution at all the stations will be taken up in the near future and continued until all of the fry are planted.

Would respectfully recommend at this time that the Tahoe Hatchery have a new floor, head box and set of troughs; also that the water supply be placed in first-class shape and an iron pipe installed to convey same from the springs to the building. This work can be done at the end of the coming season.

Respectfully submitted.

E. W. HUNT,
Superintendent.

Tahoe City.

REPORT OF SUPERINTENDENT OF EEL RIVER HATCHERY.

Grizzly Bluff, July 13, 1909.

To the Honorable the Board of Fish and Game Commissioners.

Gentlemen: The following is my report of the steelhead work for the season of 1909. The fish started running earlier this season than usual, making their first appearance in Price Creek on February 16th. The run continued until April 23d. The season was a very satisfactory one, and I took 438,800 eggs. The fry were distributed in Howe, Price, and Williams creeks.

The following is a summary of the work:

Total number of eggs taken	438,800
Total number of eggs eyed	373,000
Loss in hatching and rearing	24,000
Fry distributed—	
Price Creek	168,500
Howe Creek	174,500
Williams Creek	6,000
Total	349,000
Number of fish caught—	
Males	80
Females	107
Number of females spawned	94
Average weight of fish—	
Males	6 pounds
Females	11 pounds
Highest temperature of water	63 degrees
Lowest temperature of water	41 degrees

In conjunction with the work of taking steelhead eggs this season, I have replaced the shake roof on the hatchery with corrugated galvanized iron, as the old roof was in a very shaky condition. This will be a great improvement. I have also built a new settling tank, and replaced the old auxiliary flume with a new one built of redwood. These improvements were much needed ones and have added to the efficiency of the station very much.

Yours very respectfully, W. O. FASSETT.

GRIZZLY BLUFF, June 11, 1910.

To the Honorable the Board of Fish and Game Commissioners.

GENTLEMEN: The following is my report for the season of 1910 on the steelhead work at Eel River Station:

The fish made their first appearance on February 21st, and prospects looked very favorable for a good average take, but lack of water in Price Creek at the time the fish were running caused the main body of the fish to spawn in the river, with the result that my take was very disappointing. However, the 200,000 eggs sent me from the Ukiah Station swelled my total to respectable proportions, and enabled me to distribute a nice lot of fish in this vicinity. The run of females was much larger than the males, and at the end of the season a number of the females had to be released owing to the lack of males.

The eggs received from Ukiah have provided some interesting data, and thinking it may be of interest I am including it in my report. The eggs were taken by Mr. La Motte on the 11th day of April and were received by me on the 28th of the same month. Upon being placed in the water several hundred hatched, although they were only seventeen days old. I placed all these alevins by themselves in a separate trough, and preserved specimens of them, and also of the others which hatched on the 3d of May, seven days later, and continued preserving specimens of each lot at intervals of a week until they were distributed. In comparing the advancement, the prematurely hatched alevins matured the same as those hatched a week later, and with no greater loss, and no apparent difference; the average temperature of the water during this period was 61 degrees.

Eel River at present is simply alive with young salmon about 3½ inches long, and their jumping out of the water all along the river is best illustrated by the heavy fall of rain drops on the river's surface. In the small creeks young steelheads about 1¼ inches long can be seen in countless numbers. All in all, every indication points to a still greater increase of fish in Eel River.

During the time I have been engaged in the steelhead work I have, with your approval, replaced eleven sections of old troughs, which have been in use twelve years, and am now engaged in replacing the platform and making other necessary repairs at the dam. After regrading the main flume where it has settled in places, and moving it in closer to the bank where it runs along the bluff, this station will again be in first-class condition.

The following is a summary of the season's work:

Total number of eggs taken	172,000	
Total number of eggs eyed	154,800	
Loss in hatching and rearing	17,000	
Eggs received from Ukiah Hatchery	200,000	
Loss in hatching and rearing	20,000	
Fry distributed—		
Price Creek	167,400	
Howe Creek	163,400	
Sweasy's Lake	4,000	
Total	334,800	
Number of fish caught—		
Males	32	
Females	65	
Number of females spawned	47	
Average weight of fish—		
Males	4	pounds
Females	6⅓	pounds
Lowest temperature of water	44	degrees
Highest temperature of water	70	degrees

Yours very respectfully,

W. O. FASSETT.

GRIZZLY BLUFF, June 13, 1909.

To the Honorable the Board of Fish and Game Commissioners.

GENTLEMEN: The following is my report of the salmon hatch at this station for the season commencing December 7, 1908, and ending March 6, 1909. The eggs arrived in four shipments, as follows: December 7th, 1,000,000; December 27th, 1,500,000; January 5, 1909, 1,500,000 from

Mill Creek, and December 21st, 1,440,000 from Battle Creek, making a total of 5,440,000 salmon eggs received. The hatch was successful, and I planted in Eel River and Price Creek 5,374,200 good healthy fry.

The following is a summary of the work:

Eggs received	5,440,000
Eggs lost	49,600
Fry lost	16,200
Fry distributed	5,374,200

On the 17th of February, 1909, I received 52,500 silver salmon eggs from the Santa Cruz Hatchery. The eggs arrived in fair condition, with a loss of 1,800 en route. The subsequent loss of eggs to the time of hatching was 4,000, making a total loss of 5,800. There was practically no loss in rearing, so I distributed 46,700 fry. All of them were planted in Price Creek.

The following is a summary of the hatch:

Eggs received	52,500
Eggs lost	5,800
Fry distributed	46,700

Yours very respectfully,

W. O. FASSETT.

Grizzly Bluff, June 11, 1910.

To the Honorable the Board of Fish and Game Commissioners.

Gentlemen: The following is my report of the salmon hatch at this station for the season commencing December 5, 1909, and ending March 23, 1910. The total number of eggs received was 6,000,000, and were received in four shipments, as follows: December 5th, 1,471,000; December 26th, 1,438,500; December 31, 1909, 1,541,000, and January 10, 1910, 1,549,500. The eggs were all shipped from Mill Creek and were as near perfect as possible, the loss being practically nothing. The hatch was most successful, and the fry were distributed in Price Creek and Eel River.

The following is a summary of the work:

Eggs received	6,000,000
Eggs lost	30,255
Fry lost	practically none
Fry distributed	5,969,745

Yours very respectfully,

W. O. FASSETT.

HUNTING LICENSE SALES BY COUNTIES AND FISH AND GAME COMMISSION.

In Fiscal Year 1907-1908.

Name of county.	At $1.00. Amount.	At $10.00. Amount.	At $25.00. Amount.	Total.
Alameda	$5,441 00		$325 00	$5,766 00
Alpine	60 00			60 00
Amador	1,079 00			1,079 00
Butte	2,325 00		50 00	2,375 00
Calaveras	972 00			972 00
Colusa	1,364 00			1,364 00
Contra Costa	1,560 00		100 00	1,660 00
Del Norte	322 00			322 00
El Dorado	1,062 00		25 00	1,087 00
Fresno	3,693 00		25 00	3,718 00
Glenn	698 00			698 00
Humboldt	2,818 00		25 00	2,843 00
Imperial	559 00			559 00
Inyo	806 00	$110 00		916 00
Kern	2,070 00		25 00	2,095 00
Kings	1,000 00	10 00		1,010 00
Lake	1,192 00		25 00	1,217 00
Lassen	444 00	80 00		524 00
Los Angeles	12,140 00	180 00	225 00	12,545 00
Madera	720 00		25 00	745 00
Marin	749 00	40 00	150 00	939 00
Mariposa	385 00	10 00		395 00
Mendocino (county clerk failed to act in this year).				
Merced	1,305 00	20 00	50 00	1,375 00
Modoc	450 00			450 00
Mono	184 00	10 00		194 00
Monterey	1,897 00	40 00		1,937 00
Napa	1,362 00		50 00	1,412 00
Nevada	1,260 00			1,260 00
Orange	1,946 00			1,946 00
Placer	1,523 00	10 00	50 00	1,583 00
Plumas	605 00	40 00		645 00
Riverside	2,342 00	10 00	125 00	2,477 00
Sacramento	3,581 00	20 00	250 00	3,851 00
San Benito	727 00	10 00		737 00
San Bernardino	3,304 00	10 00		3,314 00
San Diego	2,950 00	20 00	50 00	3,020 00
San Francisco	1,870 00		250 00	2,120 00
San Francisco (commission)	12,201 00	80 00	950 00	13,231 00
San Joaquin	2,750 00	10 00	25 00	2,785 00
San Luis Obispo	1,498 00	10 00	25 00	1,533 00
San Mateo	1,363 00		150 00	1,513 00
Santa Barbara	1,768 00	30 00	75 00	1,873 00
Santa Clara	3,805 00		50 00	3,855 00
Santa Cruz	2,020 00		25 00	2,045 00
Shasta	1,970 00		150 00	2,120 00
Sierra	321 00			321 00
Siskiyou	2,716 00	40 00	125 00	2,881 00
Solano	1,982 00	10 00	50 00	2,042 00
Sonoma	3,980 00		50 00	4,030 00
Stanislaus	1,112 00		50 00	1,162 00
Sutter	578 00	10 00		588 00
Tehama	1,180 00			1,180 00
Trinity	512 00	10 00		522 00
Tulare	2,380 00	70 00	75 00	2,525 00
Tuolumne	992 00		100 00	1,092 00
Ventura	1,509 00	30 00	25 00	1,564 00
Yolo	1,429 00		25 00	1,454 00
Yuba	901 00			901 00
Totals	$113,732 00	$920 00	$3,775 00	$118,427 00

HUNTING LICENSE SALES BY COUNTIES AND FISH AND GAME COMMISSION—Continued.

In Fiscal Year 1908-1909.

Name of county.	At $1.00. Amount.	At $10.00. Amount.	At $25.00. Amount.	Total.
Alameda	$4,184 00		$175 00	$4,359 00
Alpine	60 00			60 00
Amador	880 00			880 00
Butte	2,394 00	$20 00		2,414 00
Calaveras	736 00			736 00
Colusa	1,208 00			1,208 00
Contra Costa	1,288 00			1,288 00
Del Norte	369 00			369 00
El Dorado	947 00			947 00
Fresno	3,502 00	30 00	125 00	3,657 00
Glenn	672 00			672 00
Humboldt	2,550 00	20 00	25 00	2,595 00
Imperial	499 00	10 00		509 00
Inyo	816 00	100 00		916 00
Kern	2,511 00	10 00		2,521 00
Kings	950 00			950 00
Lake	929 00			929 00
Lassen	421 00	20 00		441 00
Los Angeles	12,055 00	70 00	100 00	12,225 00
Madera	619 00			619 00
Marin	800 00	30 00	75 00	905 00
Mariposa	340 00	20 00		360 00
Mendocino	832 00			832 00
Merced	1,341 00		150 00	1,491 00
Modoc	413 00			413 00
Mono	171 00	10 00		181 00
Monterey	1,958 00	10 00		1,968 00
Napa	1,398 00		25 00	1,423 00
Nevada	1,524 00			1,524 00
Orange	1,797 00		25 00	1,822 00
Placer	1,509 00		25 00	1,534 00
Plumas	608 00	10 00		618 00
Riverside	2,268 00	30 00	150 00	2,448 00
Sacramento	3,355 00	10 00	150 00	3,515 00
San Benito	793 00			793 00
San Bernardino	3,061 00	10 00		3,071 00
San Diego	2,854 00	50 00	25 00	2,929 00
San Francisco (county clerk)	1,202 00		50 00	1,252 00
San Francisco (commission)	13,822 00	170 00	775 00	14,767 00
San Joaquin	3,025 00		25 00	3,050 00
San Luis Obispo	1,528 00		25 00	1,553 00
San Mateo	1,299 00			1,299 00
Santa Barbara	1,701 00	20 00	75 00	1,796 00
Santa Clara	3,193 00			3,193 00
Santa Cruz	1,967 00	10 00	50 00	2,027 00
Shasta	2,083 00			2,083 00
Sierra	239 00			239 00
Siskiyou	2,578 00	20 00	150 00	2,748 00
Solano	1,873 00		75 00	1,948 00
Sonoma	3,967 00	10 00	50 00	4,027 00
Stanislaus	1,182 00			1,182 00
Sutter	540 00			540 00
Tehama	1,151 00	10 00		1,161 00
Trinity	506 00			506 00
Tulare	2,578 00		125 00	2,703 00
Tuolumne	1,027 00		25 00	1,052 00
Ventura	1,452 00	10 00		1,462 00
Yolo	1,383 00		25 00	1,408 00
Yuba	832 00			832 00
Totals	$111,740 00	$710 00	$2,500 00	$114,950 00

HUNTING LICENSE SALES BY COUNTIES AND FISH AND GAME COMMISSION—Continued.

In Fiscal Year 1909-1910.

Name of county.	At $1.00. Amount.	At $10.00. Amount.	At $25.00. Amount.	Total.
Alameda	$5,614 00	$10 00	$100 00	$5,724 00
Alpine	36 00			36 00
Amador	920 00		25 00	945 00
Butte	2,394 00		25 00	2,419 00
Calaveras	734 00			734 00
Colusa	1,270 00			1,270 00
Contra Costa	1,246 00		50 00	1,296 00
Del Norte	312 00			312 00
El Dorado	864 00			864 00
Fresno	4,059 00	10 00	125 00	4,194 00
Glenn	746 00		50 00	796 00
Humboldt	3,056 00			3,056 00
Imperial	445 00			445 00
Inyo	1,025 00	30 00		1,055 00
Kern	3,550 00			3,550 00
Kings	1,233 00			1,233 00
Lake	1,028 00			1,028 00
Lassen	468 00		50 00	518 00
Los Angeles	12,779 00	80 00	250 00	13,109 00
Madera	783 00	10 00		793 00
Marin	718 00	20 00	25 00	763 00
Mariposa	325 00			325 00
Mendocino	1,301 00	10 00	25 00	1,336 00
Merced	1,470 00	10 00	50 00	1,530 00
Modoc	406 00			406 00
Mono	185 00	50 00		235 00
Monterey	2,219 00	20 00		2,239 00
Napa	1,725 00		300 00	2,025 00
Nevada	1,581 00	20 00		1,601 00
Orange	2,200 00			2,200 00
Placer	1,686 00		100 00	1,786 00
Plumas	448 00	10 00		458 00
Riverside	3,227 00	20 00	100 00	3,347 00
Sacramento	3,418 00	20 00	150 00	3,588 00
San Benito	1,050 00	10 00		1,060 00
San Bernardino	3,594 00		25 00	3,619 00
San Diego	3,349 00	30 00	75 00	3,454 00
San Francisco	915 00		100 00	1,015 00
San Francisco (commission)	15,971 00	200 00	1,050 00	17,221 00
San Joaquin	3,220 00		25 00	3,245 00
San Luis Obispo	1,341 00			1,341 00
San Mateo	1,409 00		25 00	1,524 00
Santa Barbara	1,703 00	50 00	50 00	1,803 00
Santa Clara	3,487 00		125 00	3,612 00
Santa Cruz	1,970 00	10 00	50 00	2,030 00
Shasta	2,098 00	40 00	25 00	2,163 00
Sierra	164 00			164 00
Siskiyou	2,728 00	40 00	75 00	2,843 00
Solano	1,522 00		75 00	1,597 00
Sonoma	4,340 00		50 00	4,390 00
Stanislaus	1,415 00			1,415 00
Sutter	631 00			631 00
Tehama	1,115 00	20 00		1,135 00
Trinity	616 00			616 00
Tulare	2,923 00		75 00	2,998 00
Tuolumne	986 00		50 00	1,036 00
Ventura	1,782 00	30 00	50 00	1,862 00
Yolo	1,450 00		50 00	1,500 00
Yuba	960 00			960 00
Totals	$124,210 00	$750 00	$3,400 00	$128,450 00

NOTES ON THE STRIPED BASS IN CALIFORNIA.

By N. B. Scofield.

The striped bass is to be found in the San Francisco Bay region or in the lower Sacramento or San Joaquin rivers, in varying numbers, in any month of the year. In the lower rivers, however, more of them are caught in the spring and autumn.

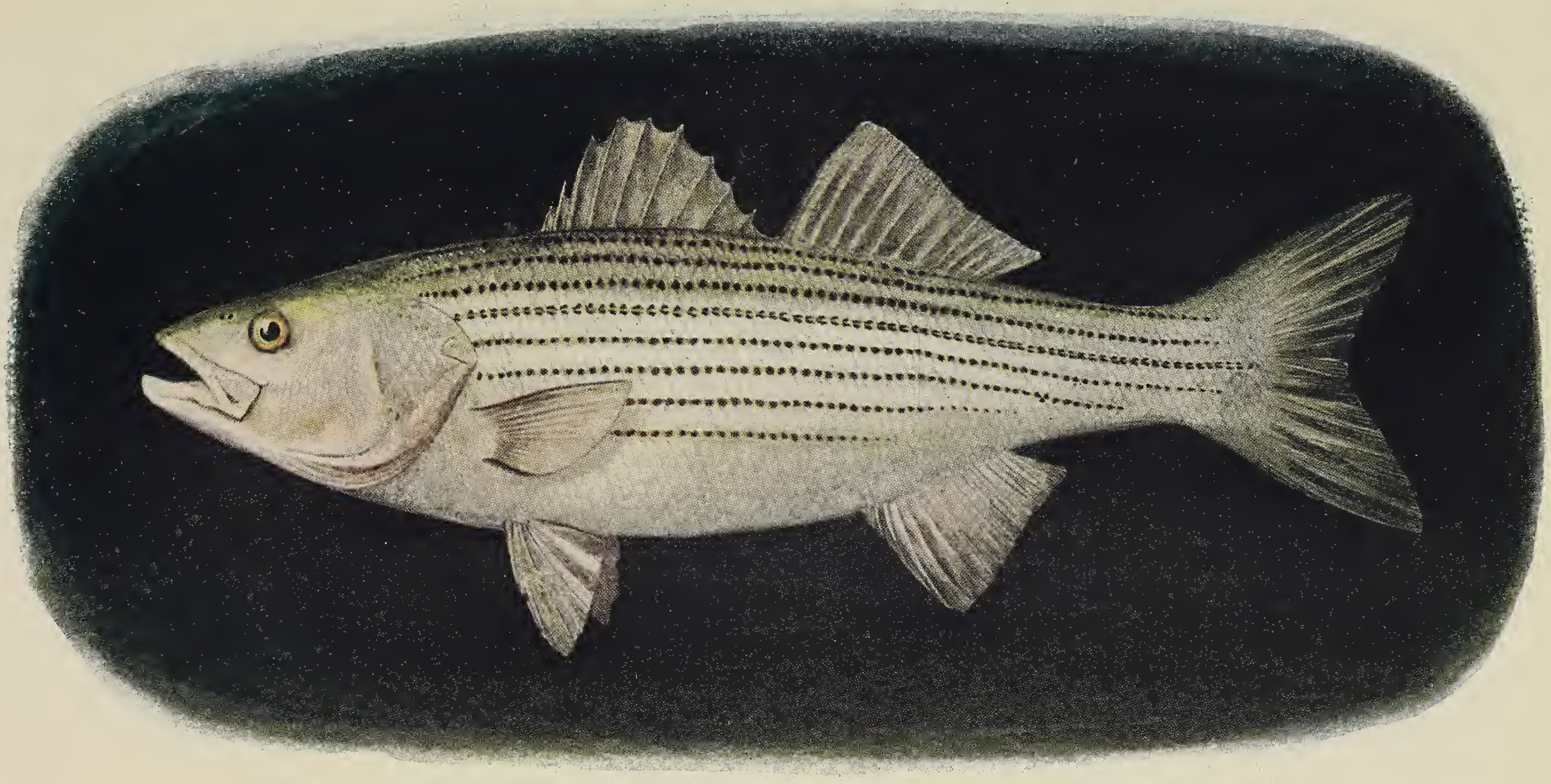
The spring run, as it is termed, is mostly of mature or ''spawn bass,'' evidently ascending the rivers to spawn, and takes place during April, May and June. The average weight of these fish is between twelve and fifteen pounds. Thirty-pound fish are common and occassionally fifty and sixty-pound fish are taken.

The fall run on the rivers commences usually in September, the time being somewhat variable, and lasts from two weeks to two months. The fish of this run are smaller; immature bass, not often over five or six pounds, and according to the fishermen are bright, fresh run fish. The small sized bass are more apt to be found in schools, and the large catches in seine or gill net are usually of this size. In the lower bays they are often found on the flats voraciously feeding on schools of ''sardines,'' making a sucking noise similar to that of the carp when feeding at the surface of the water. Often a school of these bass will run into one of the numerous tule lined sloughs of the Sacramento and San Joaquin delta, evidently attracted by the small river fish, which they drive before them, feeding as they go. Such schools are often indicated by a large number of shags, gulls, and fishing birds, which take this advantage to feed upon the maimed and frightened fish. Occasionally a fisherman is lucky enough to find one of these schools and will catch all his boat will hold.

The striped bass seems to be quite notional. It will suddenly appear on the river drifts and as suddenly disappear again, and no trace of them can be found. The fishermen who have now had fifteen or twenty years of experience fishing for them in these waters still trust mostly to chance in locating them, not being able to figure out their movements other than that rough water spoils the fishing, the theory being that they leave the flats and sloughs in rough weather and take to the deeper parts of the river where the nets do not reach them.

These bass are known to the river fishermen as winter bass. They ascend practically all of the sloughs at the mouths of streams, and run up the streams themselves.

The spring run. The San Joaquin River has been usually selected by this run, and they are taken by the fishermen in gill nets between Antioch and Bouldin Island. By far the largest portion of the spawn bass are taken near Bouldin Island. The fish are seldom taken above this point during the spawning season, but after spawning they ascend



STRIPED BASS (Roccos lineatus)

the rivers for long distances, or enter the sloughs or flooded lands in search of food, for after spawning they again become voracious feeders.

In the years 1903, 1904, and 1905 spawn bass were so plentiful about Bouldin Island that the fishermen, in order not to glut the market, agreed among themselves to catch no more than 600 pounds to the boat each twenty-four hours. They frequently got more than double this amount at one drift of a gill net.

Many of these fish were with mature eggs, and the fishermen all testify that the bottoms of their fish lockers were covered with eggs. Although bass with mature eggs may be found between December and June, almost all are found between the middle of April and the last of May. When the question of artificially hatching the striped bass came up, and a desirable place for a hatchery was looked for, Bouldin Island seemed the only logical place. A hatchery was built here in 1907, equipped with McDonald hatching jars and apparatus for getting the necessary water from the river. Before the hatchery was completed in April, many bass were being caught by the fishermen. The hatchery depended on the fishermen for any ripe eggs they might take. The fishermen took a lively interest and assisted in every way. Soon the capacity of the hatchery was taxed. At one time one fishing boat in one drift took eight female bass with eggs running freely, but there was room in the hatchery for the eggs of four of them only. From many lots of eggs no fish hatched. Other lots hatched 5 per cent only, and from that up to 50 and 60 per cent. One lot hatched a very high percentage of the eggs.

The results of the season's work were very encouraging, for hatching striped bass was still in the experimental stage, and the results in number of eggs hatched during this season of 1907 were much better than had been obtained on the Atlantic coast. It was not determined just why so many eggs failed to hatch, but it was laid to unsuitable water or some defect in hatchery method. The run of bass, while not up to the average, had been very satisfactory.

The season of 1908 found the hatchery better prepared for work and equipped with microscopes and apparatus for determining the cause of the failure of so many eggs to hatch. The run of bass was almost a failure, and the take of eggs so small that many of the experiments came to nothing for lack of eggs to experiment with.

It was soon found that the first cleavage of the germinal disc in the developing egg takes place about two hours after fertilization. So with the microscope it was possible to tell within two hours after the eggs were taken just what per cent was fertilized and developing. It was found that the loss of eggs was not due to bad water or any defective method of handling the eggs in the hatchery, but due to the nonfertilization of the eggs.

Where 40 per cent or more of the eggs from one fish were fertilized, they could be hatched without much difficulty. When there was a lower per cent of fertilization the unfertilized eggs became fungus infected, and between the twelfth and twenty-fourth hour after taking they became lighter than the water and rose and floated out of the jar with the current, no matter how slight this current was. These unfertilized eggs became attached to each other and to the live and developing eggs, and when they floated out of the jar they took many live eggs with them. In jars where there was only 10 per cent or 15 per cent of fertilized eggs, all might be lost in this way.

The milt of the male in nearly all cases showed active spermatazoa, thus narrowing the trouble down to the egg or the method of fertilization. Both the wet and the dry methods of fertilization were used, with no very appreciable difference. What difference there was, was in favor of the wet method. Frequently a lot of eggs were taken which did not swell properly in the water, showing they were immature.

Most of the lots of eggs taken were a pale green color, but a few lots had a golden green color. The golden shade is caused by a pigment in the germinal disc. It is probable that the eggs are not mature until this pigment is formed, but some lots hatched a small per cent of fish where the pigment did not show, and some with the pigment very noticeable hatched no fish. The better lots of eggs showed the pigment. We reached the conclusion that the trouble had been the eggs of the fish taken were slightly immature and incapable of fertilization.

We found that with the use of copper sulphate (1 part copper sulphate to 100,000 parts of water) it was possible to hatch lots where there was only 5 per cent of good eggs. The fungus growth on the outside of the bad eggs was killed and the good eggs would not adhere to them. A rather strong current could be turned on and the good eggs would remain in the jar and the bad ones would mostly pass out. The fish hatched from these eggs were just as strong as those hatched at the same time without copper sulphate. The young fish after hatching are able to stand this strength of copper sulphate. The yolk sac is absorbed seven days after hatching.

The run of bass at Bouldin Island during this season was very light. Most of the fish taken by the fishermen were quite green, and by the middle of May they caught both green fish and fish that had already spawned. The taking of a female bass with ripe eggs was evidently a lucky chance, and we had not been able to locate their spawning place.

A gauze tow net was used at different times during the season in the river, the sloughs, the flooded islands, and on the tule flats in the hope of catching a young bass just hatched, or eggs before hatching, and thus get some clue to where the striped bass spawns, but without results.

Season of 1909.—Having formed the theory that the striped bass caught at Bouldin Island are almost all sexually immature, and having so far been unable to locate their spawning beds, we hope that by penning the fish when caught they could be held until ripe. The penning of striped bass had been tried on the Atlantic coast without success and we knew they were exceedingly difficult to hold alive in captivity, yet we believed that with a sufficiently large pen, fenced off in the river, they could be held. By act of the State legislature the months of May and June had been made a close season on striped bass for net fishermen. We employed a fisherman with boat and suitable nets to fish during this time for the hatchery.

The run of spawn bass this season was exceedingly poor. Very few of the fish were to be found near Bouldin Island or on the river below. While ripe males were not uncommon, the females taken were most of them sexually immature. Only one apparently ripe female was taken, and from this fish only about 5 per cent of the eggs were hatched. The capture in the river of only green or spawned out fish would indicate that the river is not the place of spawning; but every conceivable place was fished during both the day and the night—the tule flats, the sloughs, the interior of the flooded island were fished with the result we were not nearer to the solution of the problem of where the striped bass spawn.

We built one pen in the edge of the river 3 by 40 feet in which the water stood about 6 feet deep at the outer edge and 2 feet deep at the inner side next the bank, with tules growing at one end and the rest partly overhung with willows.

We found that immature female bass and mature male bass caught in gill nets and carefully handled and placed in lively condition in this pen would live five or six days. The same kind of fish caught in fyke nets would live ten or twelve days. Female bass apparently nearly in spawning condition caught in gill nets could not be kept twenty-four hours. They injure themselves in some way when caught in the net and do not recover. We caught no nearly ripe females in the fyke net. Thinking possibly there was not current enough in the pen we had, we built a pen 16 by 20 feet by 5 feet deep, divided into two compartments 10 by 16 feet each. The framework was of 2 by 4 pine, and the sides and bottom covered with woven wire fencing. The pen was floated and anchored in the current of Potato Slough. The fish placed in this pen did not live as long as in the other. The current seemed to be too strong for them. In neither pen did they struggle to get out, but seemed not to recover from their struggles when caught. In all fifty bass were penned. Our experience would show that the striped bass can not be held in pens until they mature unless possibly the pen be made very large and so placed that the fish can be trapped and guided into the pen without handling.

There were several theories advanced to account for the poor run of bass in the San Joaquin River. For a year the dredgers had been active building up the levees and the silt and dirt thus stirred up might cause the bass to shun the river. Another theory was that the bass turned into and continued on through the flooded Sherman Island, whose levees had broken the year before, and continued up the Sacramento. The number of bass taken in the Sacramento was larger than the spring before, which seems to bear out this theory.

Another theory is that the bass are becoming scarce, due to the large catches and to the destruction of bass in the reclaimed islands when they were pumped dry. The scarcity of the bass in the San Joaquin may be due to all of these causes. Certainly immense numbers of bass have been destroyed in the islands. When the levees break the small river fish and carp enter the flooded lands and the bass also seem to prefer these islands for feeding grounds; and when the levees are built up again and the water pumped out, many tons of bass of all sizes are left.

The fishermen say that the sand bars and flats in the San Joaquin, which used to be of clean sand, are now covered with silt and trash stirred up by the dredgers, and they catch no bass now on these bars, where formerly they were often taken.

Most of the bass taken at Bouldin Island this season were taken in Georgiana Slough on their way through to the Sacramento. The catch on the Sacramento was larger than the year before, the largest number being taken in Steamboat Slough. The run was quite good in Cache Slough and Prospect Slough.

Season of 1910.—During this season two fishermen and boat were employed to fish for striped bass in the neighborhood of Bouldin Island, and another boat and two fishermen were employed to fish in Cache Slough and tributaries on the Sacramento side.

The run of spawn bass on the San Joaquin was better than the previous season, but all females taken were green and immature. Ripe males were taken in plenty. The river above Bouldin and all sloughs within ten miles were fished, the fishing being done mostly by night. The Mokelumne River was also explored. Bass were taken only near Bouldin Island mostly in the main river.

The Cache Slough country on the Sacramento was thoroughly explored. The striped bass are found in increasing numbers each year in this region. The greater number of bass are taken in Steamboat Slough, just above the mouth of Cache Slough, during the early part of the runs. Later they are found more plentiful in Cache Slough, where they are taken in nets in the main slough. Most of the bass running up Cache Slough turn off and ascend the clear water of Prospect Slough, through which they can reach the Big Lake, back of Clarksburg, and from there through inlets into the Sacramento again above the city of Sacramento. These sloughs and the Big Lake were pretty thoroughly fished during the bass run. Almost all the striped bass taken were very green and apparently not within several weeks of their spawning time. According to those familiar with the region, the striped bass come into Prospect Slough late in May and in June—a sort of belated run—and spawn in the main slough, but this season this run did not appear. The run here was earlier this season than last and evidently continued on up the river. They were reported as being seen early in May as far up as Tehama.

In the clear water of Prospect Slough the bass take the spoon readily, and this has become a popular fishing ground for those who enjoy the sport of catching the striped bass with rod and reel. The usual method is to troll behind a gasoline launch. Large numbers were taken this season in this manner; probably more pounds of fish than were taken by nets in Cache Slough.

If any future effort is to be made at hatching the striped bass, Cache Slough and its tributary, Prospect Slough, offer exceptional opportunities of trapping and impounding the bass in their early run up these sloughs. Prospect Slough is much of it narrow and not so deep, but that impounding nets could be set for catching them on their way up the slough. There should be no great difficulty in trapping the bass and leading them into an inclosure or blind slough, of which there are several, for they are readily caught in the small winged fyke nets used by the "cat" fishermen. The shallow Big Lake would be an excellent place for setting impounding nets. If the bass can be impounded and not be handled, as is necessary with seines and gill nets, they ought to reach the spawning stage in confinement.

N. B. SCOFIELD.

NOTES ON SPAWNING AND HATCHING OF STRIPED BASS EGGS AT BOULDIN ISLAND HATCHERY.

By N. B. Scofield and G. A. Coleman.

Examination of Lot "A," April 28, 1908, 6.30 p. m. to 9.00 p. m.

Both female and male had been caught about two hours and were dead when eggs were taken. Eggs taken at wharf at 6.30 p. m., spawned in a new dry tin pan, the milt spurted over them, then carried to the hatchery (about thirty seconds in transportation), about a pint of filtered river water added, and the eggs gently agitated by tipping pan for about one minute, more water added, and the milt decanted.

The milt from male was examined within five minutes after taking, but no movement of the spermatozoa was perceptible. The milt had a ropy, thick, white appearance, did not mix with water, but sank to bottom when put in clear water or normal salt solution. Eggs were taken from this lot, and milt, which had been caught in a vial of normal salt solution, added; the washing was done in distilled water, and they were placed in distilled water to swell, but did not swell at all.

April 29.—Eggs were taken at intervals and examined under the microscope, but no sign of segmentation could be found. Eggs were examined under high power of microscope for bacteria and fungus, but none could be distinguished. The eggs are constantly turning while floating to the top of jar and going over; an examination of these eggs shows that the germinal disc was broken or pinched off, and in some cases the yolk was ruptured. At 6.30 p. m. (twenty-four hours), fully 50 per cent of the eggs had passed off this way.

April 30, 7.00 a. m.—An examination of the jars showed that very few eggs were left, and these showed no signs of segmentation, hence jars were emptied. Specimens in mould dish were examined at 9.00 a. m. for bacteria and fungus, but none found. Examined again at 4.00 p. m., when it was found the bacteria (*Bacterium terms*) had developed in countless numbers. A distinct odor of putrid fish was discerned on opening dish.

4.00 p. m.—A number of males and females were examined on wharf, but no ripe ones found. Milt from these males showed no movements under microscope in three to five minutes.

Lot "B," April 30, 7.00 p. m.

This lot of eggs was from a female which had been dead about one hour, and male had been dead about the same length of time. Both eggs and milt were taken at wharf. Eggs taken in a new dry tin pan. The milt expressed directly over them. The pan dipped immediately (in about fifteen minutes) into river from side of boat. They were in this water with the milt while carried to the hatchery (about three minutes), and washed in water from overflow taken in the hatchery. Allowed to swell one hour before beginning to put in jars. The last of them remained in pan 2½ hours. About 25 per cent of this lot turned white before they were put in jars. A study of these eggs showed that no impregnation took place, just as in lot "A." The eggs swell, the germinal disc contracts and forms a cap on one side of the yolk. This cap remains in position up to about twelve hours, when it pinches off. The egg turns a whitish color, becomes buoyant and floats off through the siphon tube. A part of the eggs in this lot were taken in normal salt solution and milt, which was caught in normal salt solution applied. Specimens from these were preserved, and a study of them shows that they acted in just the same way as the others.

Lot "C."

Tried the experiment of taking some of this lot of eggs without milt and swelling them, placing them in a jar under same conditions as the impregnated eggs. They developed exactly as lots "A" and "B," and the germinal disc pinched off in just the same way. This is practical proof that the eggs will develop to this stage without impregnation, and also that impregnation did not occur in lots "A" and "B."

Lot "C," May 6.

Male and female alive and in prime condition. The dry method was followed. The self-straining bucket was used. This consists of a cylinder of perforated tin, fitting inside the regular collecting bucket, barring a space of two inches between tin and side of bucket. Water is poured over the eggs, and the movement of cylinder in the bucket strains off the milt. The first segmentation occurred in two hours, and it was estimated that 30 per cent of them would develop embryos, and 25 per cent of them did develop into fish. There was about 50 per cent died after developing into embryos, thought to be smothered from lack of circulation of water, due to collection of sediment on sides of jar.

The non-fertile and unimpregnated eggs passed over within twenty-four hours, just as in the first lots "A" and "B." A part of these eggs was saved and left in the jar to watch development of fungus and bacteria.

May 8.—The first trace of fungus was found on the dead eggs in the above jar within forty-eight hours after taking; specimens were removed to mould for study.

May 9.—The fungus consists of two species. One has the appearance of saprolegnia, the other a segmented form of a higher order, and both are in fruiting stage, showing that they develop very rapidly. So far no trace of the fungus on live eggs. In the case of the ripe eggs taken from spawned female, a small percentage of fertilization was obtained in a normal salt solution after eggs had been taken three hours.

Lot "D."

May 24.—Eggs from two females taken by McLeod. Milt from buck taken by McLeod at same time. Wet method employed by McLeod. Brought into hatchery half an hour after taking, with milt still on. Washed up in hatchery in four dish pans about 1,000,000 eggs. Apparently 30 per cent of segmentation at two hours. Apparently 25 per cent had turned white.

May 25.—Eggs disturbed at twenty-four hours by Ball, condensing the good eggs into three jars and pouring off bad ones.

May 26.—Do not seem to have suffered by handling.

May.—Twenty-five per cent of this lot hatched into fish.

LOT "E."

May 24, 8.00 p. m.—Eggs taken by McCrea from female which he thought was ripe. Milt from buck which he said was in prime condition. Dry method employed. Brought to laboratory in spawning pan. Was very white with milt which was stringy (not ripe). Washed up in hatchery. At two hours, about 1 per cent segmentation. Put in jars and kept twenty-four hours.

May 25.—No sign of embryos; hence thrown away.

LOT "F."

May 24, 9.00 p. m.—Eggs from spawned out female taken by "Nibsey," about 3 miles above Bouldin. Milt from male taken at same time. Wet method employed by Ball. Female had been very roughly handled in taking from net, but eggs had ripe appearance. Eggs taken in 3 gallons of water (about 20,000). Milt added and left for one hour; at two hours—50 per cent segmentation.

May 26.—About 50 per cent ready to hatch. Used for experiments with copper sulphate.

LOT "G."

May 25.—Eggs from a "spawned" female. Milt from buck taken half an hour later (not ripe). Wet method employed by McLaughlin. Brought into hatchery in self-straining bucket. In two hours about 50 per cent fertilization. Put in open jar.

LOT "H."

May 25.—Eggs from female taken by Woods. Milt from buck taken by Woods. Female in good condition and eggs apparently ripe. Male small and milt green (stringy). Wet method employed by Cassell. At two hours about 25 per cent fertilization; hence were not put in jars.

LOT "I."

May 28.—Female and male taken by McLeod. Eggs apparently ripe. Milt not very good. On questioning them closely, found they had taken the female from net, expressed the eggs in pan dry, added a little water to keep them moist and kept them in the water until they got a buck (about fifteen minutes), then added the milt. The eggs thus had time to begin swelling before milt was added. At two hours about 5 per cent of fertilization.

LOT "J."

May 28.—Female and male caught by Herman Wredt, about 3 miles up river from Bouldin. Said they were both ripe. Wet method employed. Eggs kept in gasoline can for two hours. Washed up in hatchery. Developed 25 per cent of fertilized eggs.

LOT "K." THE BANNER LOT.

May 28.—Female and male taken by Woods. Both in prime condition. (Eggs and milt ran freely.) Eggs a golden green color when taken. Milt white, but ran out like cream. Eggs taken in spawning pan, a little water added, and a *very small quantity* of milt added. The water was changed frequently in transporting eggs, as they were carried in boat for five hours. These eggs were taken in Disappointment Slough, some 14 miles from hatchery, and in the night-time. He had no bucket in which to place the eggs, so transferred them from spawning pan to a stew kettle, which he happened to have. In working with their engine, he would let eggs go for an hour or more at a time without washing. It was between five and six hours from the time eggs were taken to time they reached the hatchery. He washed them on arriving at his ark, and when they were brought into hatchery not a particle of milt could be seen on them, and there were very few dead eggs. All had a clear greenish color. There appeared to be 85 per cent of them fertilized when they were brought in.

May 30.—There were actually hatched from this lot out of 280,000, 227,000 fry, or 71 per cent, and this number planted in shallow water about 3 miles above Bouldin.

Lot "L."

May 28.—Male and female taken by "Nibsey." Spawning and fertilization attended to by Grey. He thought these eggs ripe, but sample brought to the laboratory showed very dark green with white spots. He said fish were very roughly handled in taking from the net. In two hours about 5 per cent fertilization. Put up and kept twelve hours (no good eggs).

May 29.—Male and female taken by Woods. Eggs and milt taken by McLaughlin. Found a few eggs (about half pint) left in female when she was brought in by Woods. They were a light yellowish green, ran freely, and separated easily in water. The milt was examined and found to be not very lively; it came out in thick lumps. Wet method used. Eggs brought to hatchery in thirty minutes after taking. Washed in laboratory. Developed 50 per cent of fertilized eggs.

GENERAL CONDITIONS, TEMPERATURE OF WATER, ETC.

On Saturday and Sunday it was warmer than at any time this spring, bringing the water up to 66 degrees or 68, which brought a fair run of bass on Sunday afternoon and with varying luck during the week. The north wind seemed to stop the catching of bass, though a few other fish were caught. The sudden drop of the temperature on Thursday night, combined with a northwest wind, stopped the bass entirely, so that the first drift on Sunday, May 31st, yielded only one or two very small bass, and the second drift, Sunday night, only a few green males.

EXPERIMENTS WITH THE SPERMATOZOA.

Spermatozoa are active for about three minutes in water, after which time their swimming motion ceases. Placed on a microscopic slide they become attached to slide and cover glass by their tails, and their swimming ceases within one minute. Occasionally milt taken from a male does not show active spermatozoa at first, but after being left in a dish exposed for half an hour they become active when placed in water. If first they are placed in normal salt solution (.05 per cent), they will become very active on being placed in water. The salt solution seems to have a stimulating effect. The spermatozoa are active in water ranging from the temperature of freezing up to 90 degrees Fahrenheit. They are most active at temperature of 68 degrees Fahrenheit. They are killed at temperature of 100 degrees—110 degrees Fahrenheit. At a lower temperature than 42 degrees they are very sluggish. It was found that milt left in a dish exposed to the air, at a temperature ranging between 54 degrees and 68 degrees Fahrenheit, showed active spermatozoa after twenty hours.

We hope to demonstrate that striped bass eggs can be kept in an open dish and fertilized after several hours, as has been done with salmon and whitefish eggs, but all the lots of eggs saved for experiment happened to be from lots that turned out to be immature.

FOOD OF ADULT STRIPED BASS.

The food of the adult striped bass in the rivers is principally of carp, hardheads, and split-tails. Nearly all the fishermen claim that when the carp is plentiful it is their principal food. They even advance the theory that the bass are not so numerous in the San Joaquin because the carp are not so plentiful on the lower river, and they run up the Sacramento because of their great abundance in those waters.

FOOD OF YOUNG STRIPED BASS.

An examination of the stomachs of fifty young bass averaging 3 inches in length, which were taken at ''Morrison's Bite'' in Napa Creek on September 10, 1908, shows the following contents: Crustaceans, a species of Mysis, 30 per cent; of young shrimp, 15 per cent; of a species of Gammarus, 1 per cent; of an Isopod, 1 per cent, and 1 small crab. Marine worms or annelids, a species of Nereis, 45 per cent; of species not recognizable, 5 per cent; small fish, species not recognizable, 2 per cent.

It will, therefore, be seen that on this feeding ground, at least, marine worms comprise 50 per cent of the food, crustaceans of marine species 48 per cent, and small fish only 2 per cent. The young shrimp and young fish were taken from the stomachs of young bass of 3 to 4 inches in length and the other small crustaceans from the stomachs of specimens 3 inches and under in length, showing that the young bass begin feeding on the small species of crustaceans and worms, and as they grow in size are able to take the shrimp and young fish.

KEY TO FIGURES.

Fig. 1—Young striped bass—just hatched 80 hours from fertilization of egg.

Fig. 2—Young striped bass at seventh day.

Fig. 3—Young striped bass at thirteenth day.

Abbreviations. O.G., oil globule. Yk. Sc., yolk-sac. Br., brain. Ht., heart. St., stomach. An., anus. Bld., bladder.

The natural size of specimens is indicated by a line marked N.S. and all figures are magnified 15 diameters.

A study of the specimens shows that the yolk-sac is not entirely absorbed until after the seventh day, and that the stomach is not well developed until about the thirteenth day. The young fry were kept for two weeks in the McDonald hatching jar by removing the siphon tubes and replacing the top with silk bolting cloth, allowing a small stream of water to flow on the cloth.

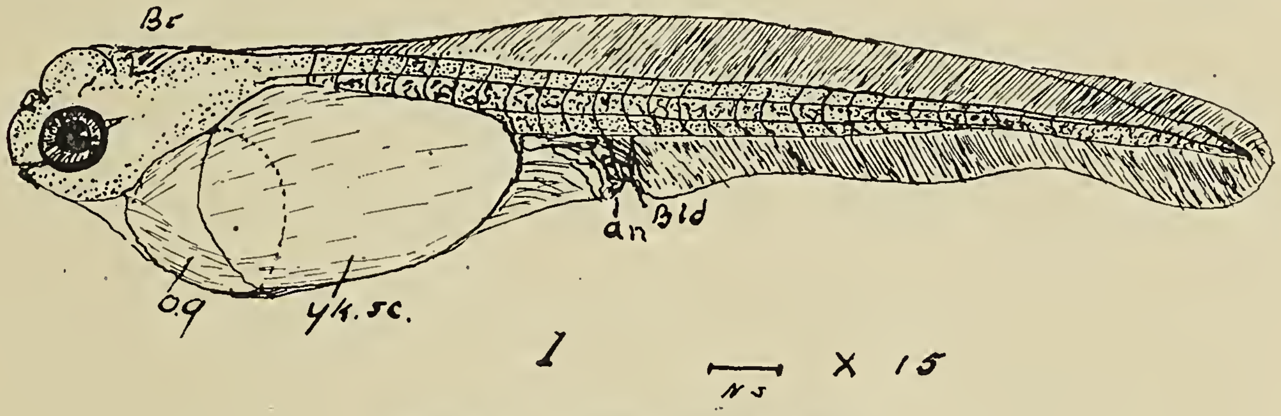


Plate 1. Young striped bass.

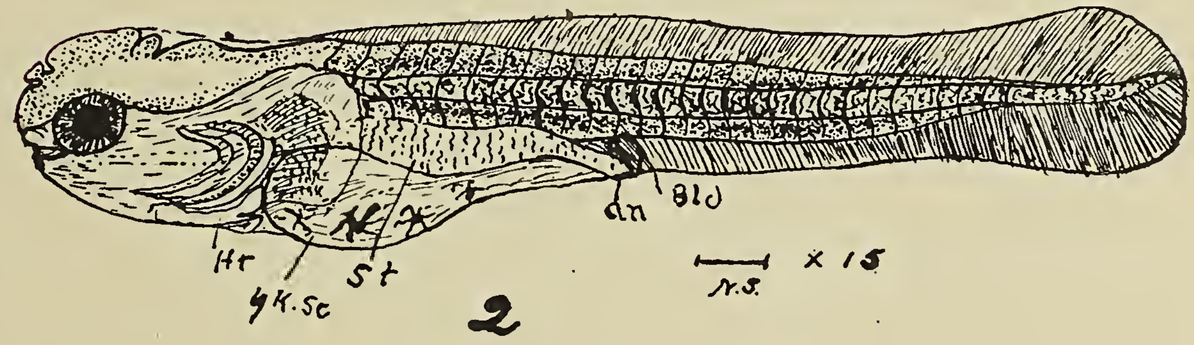


Plate 2. Young striped bass.

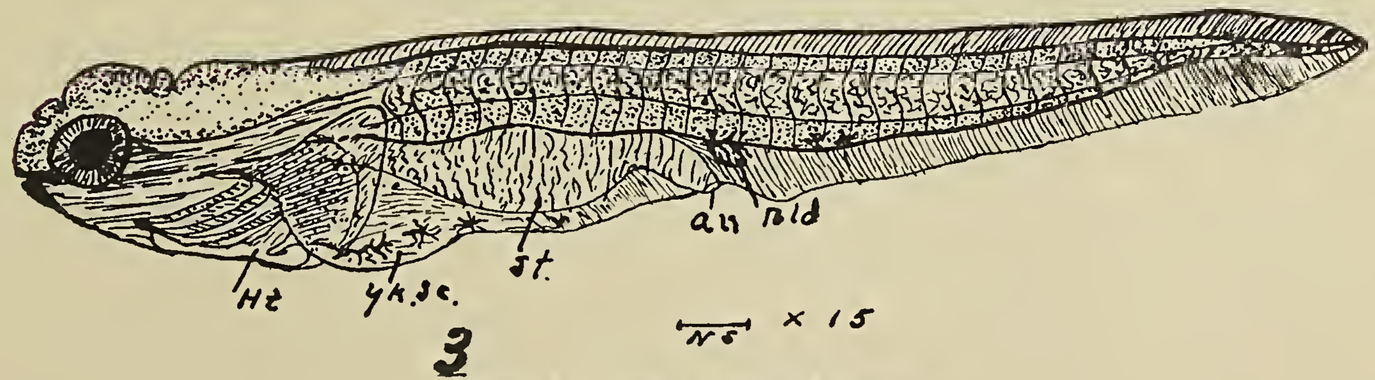


Plate 3. Young striped bass.

EXPERIMENTS WITH COPPER SULPHATE IN KILLING FUNGUS INFESTING THE EGGS IN HATCHERY JARS.

A number of experiments were tried to determine if this fungus can be killed by the use of copper sulphate without injuring the fish.

1. The fungus can be killed by application of copper sulphate (1–500,000 parts).
2. Fish or developing eggs are killed by application of copper sulphate (1–10,000 parts).
3. A small proportion of eggs are killed by solution of 1–25,000.
4. About 1 per cent of eggs are killed by application of 1–50,000.
5. The developing embryos will stand an application of 1–100,000 parts of copper sulphate without harm. This strength kills all the fungus and other organisms except small crustaceans.
6. It can be applied directly to the affected jars by dropping the required quantity into the jar and allowing the water to run as it ordinarily would.

Example.—A jar containing 5,000 c.c. of water would require one twentieth of a gram of copper sulphate to equal 1 part to 100,000.

It may be applied to the entire lot of jars by mixing and dissolving the required quantity in a small amount of water and adding it to the water as it runs in from the pipe.

Example.—If the water is running at the rate of 2½ gallons per minute (1,000,000 c.c.), it would require 10 grams of copper sulphate dissolved in 5 quarts of water and added slowly to water at head.

This experiment was actually tried and a lot of eggs which were infected with fungus left attached to the trough, also a lot which had been treated twice by dropping sulphate into jar. Neither one of these lots were affected. The fungus is thus cleaned out of troughs and it may all be flushed out by running in fresh water after the water with sulphate has been in for thirty-five minutes.

The copper sulphate may also be used in a strong solution for cleaning used jars. There is usually a coating of oil on the inside of jars after one lot of eggs has been hatched in them and on this oil a collection of fungus and other micro-organisms. The application of the copper sulphate cleans this oil off and kills all fungus or bacteria that may be collected on the sides of the jars.

Troubles.—A considerable amount of trouble was experienced with most lots of eggs in keeping them in the jars at about 12 to 24-hour stage. The bad eggs became attached to the good ones and carried them over. It was found that under the ordinary pressure about 10 per cent of the good eggs would go off in this way. An examination under the microscope of the eggs that were going off showed that they were connected by the fungus and other organisms which collect on the dead eggs and attach themselves to the good ones, one bad one sometimes having two or three good ones attached.

It was found necessary to turn the water off during this stage, flushing off the dead eggs occasionally in order to not smother the live ones. One of the jars containing the larger percentage of dead eggs and in which the carrying over was greatest, was treated with copper sulphate (1–100,000) twice (30-minute interval). The water was then turned on in a stronger current than usual. This jar was kept going all the time that the other jars were shut off. The dead eggs moved off slowly, and while the live ones were in constant motion they did not go out.

From this experiment it would seem that the fungus and micro-organisms were killed by the application of the copper sulphate, and when killed were removed from the eggs by the constant motion of the eggs. The dead eggs were thus carried off without their becoming attached to the live ones, and the necessity of turning off the water (which endangers the fish from lack of oxygen) to keep in the good eggs was avoided.

PHEASANT RAISING.

Arranged by Chas. A. Vogelsang.

INTRODUCTION.

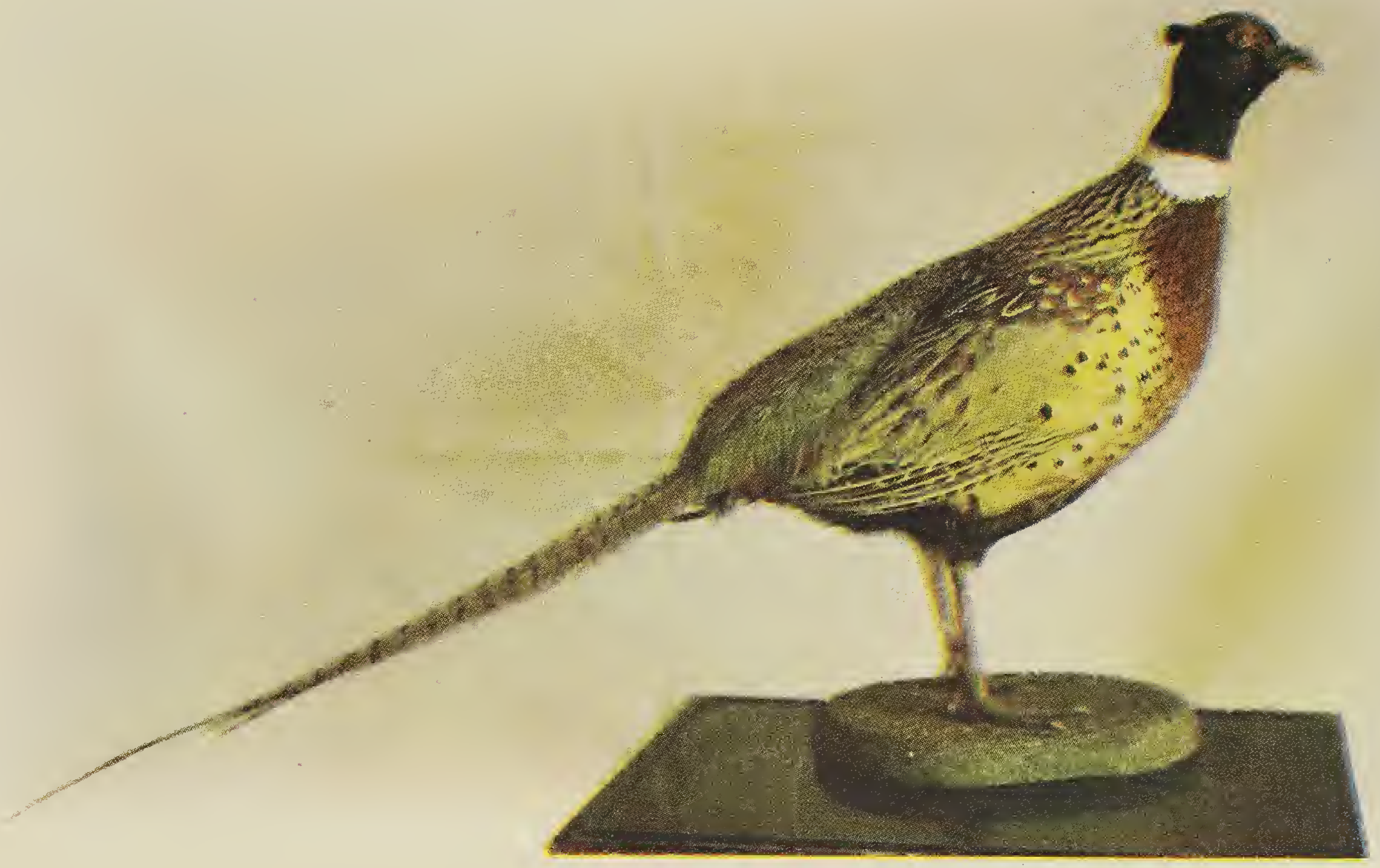
The State Fish and Game Commissioners, realizing that there is a strong and unsatisfied demand by hotels, restaurants, and by private citizens who do not hunt for wild game, and with a constantly increasing population, which renders it necessary to place greater restrictions (such as longer closed seasons and lessened bag limits) upon the amount of game that can be taken, believe that the situation could best be met through the establishment of a game farm, where pheasants and other game birds could be raised and distributed throughout the State, to people who would agree to give them proper protection and attention, and would take up the work of propagation seriously. The raising of pheasants in captivity has been carried on for years in European countries, and with considerable success in Eastern States.

It is the intention of the Fish and Game Commissioners to recommend at the forthcoming session of the legislature that pheasants raised in captivity can be sold in the markets. It would mean a new industry and would serve a double purpose. It would reduce the drain on wild game in the field, and give the profit that formerly went to market hunters to citizens and taxpayers who engage in a legitimate business.

At practically every session of the legislature for the past ten years some variety of game bird or animal has been added to the nonsale list, leaving wild ducks, wild geese and rabbits the only game that can be sold in the markets. It is only a matter of a very short time until wild ducks are added to the nonsale list.

The establishment of the game farm has been rendered possible by the hunting license law, which provides yearly a large revenue. Such a farm has been established near Hayward, Alameda County, at a cost of approximately $10,000, which includes in its equipment, houses, barn, water tank, pumping plant, pens, horse and wagon, necessary tools, and the original stock of birds. Our first year's work was performed under serious disadvantages. We raised, however, 1,200 pheasants. We expect to have 3,000 for liberation this year. All expenses in connection with this game farm are paid out of the hunting license fund, without taxing the general fund of the State one cent.

As an aid to those who are desirous of embarking in such an enterprise, we offer the following brief account of methods that have been proven successful by this Commission and other experienced breeders.



TYPE, MALE RING-NECK PHEASANT (Phasianus torquatus)

TRICHROMATIC PHOTOGRAPH TAKEN FROM MOUNTED SPECIMEN

We have quoted largely from Farmers' Bulletin No. 390 on ''Pheasant Raising in the United States,'' issued April, 1910, by the United States Department of Agriculture, and prepared by Henry Oldys, Assistant United States Biological Survey.

PENS.

The location of the pens is a most important factor. Well drained, sandy or gravelly land facing the south should be selected if possible, and the pens arranged to get all the sunshine possible during the wet months, as sunshine is one of the very best preventives of bird diseases. In hot locations the pen can be shaded when necessary.

A good sized pen or run for one cock and four hens would be about ten feet wide by sixteen feet long and six feet high. The sides and top should be covered with one-inch mesh poultry netting, carefully fastened and sunk into the ground *at least a foot,* to keep out burrowing animals. It is well to have an entrance at both ends of the pen for convenience in gathering eggs. A shed should be built in the north end of the run, with the side facing the sun, open. This shed should be at least four feet wide by six feet long and as high as the sides of the pen. A roost should be provided the length of the shed and a foot and a half above the ground. The *front of the shed must be left open* or the birds will not enter; the roof, rear and ends should be tight. When possible, it is well to enclose in the run small trees or shrubs for the birds to use as perches and for roosting; they will, besides, provide a shade during the hot summer months. Pheasants usually refuse to roost under cover; consequently, roosts of some sort must be provided in the open. Where more than one pen is used, they should communicate with each other, either directly or through a covered alleyway. This greatly facilitates the moving of birds from pen to pen.

It is absolutely essential that the pen be kept clean and free from lice at all times. The pheasant is a wild bird, with greater vitality than domestic poultry, yet conditions and diseases that affect poultry but slightly are fatal to the hardier bird. It is, perhaps, safe to say that most failures in pheasant rearing are due to filth and lice. We can not emphasize this fact too strongly; keep your pheasants in clean quarters and free from lice or you will lose them.

Before the beginning of the mating season it is advisable to move the adult birds to a fresh, clean pen. The ground in the old pen should then be spread with unslaked lime, allowed to stand two or three weeks, and then spaded up and planted to some grain or vegetable crop. All woodwork about pens and sheds should be sprayed or washed several times during the year with a good wash made with unslaked lime and water, to which has been added carbolic acid in the proportion of six ounces of acid to the gallon of wash. No whitewashing should be done during the laying season, as the hens are so affected by the odor as to stop laying.

HANDLING NEW BIRDS.

When a shipment of pheasants is received, first of all consider that they will feel strange and timid; therefore, they must be quietly handled. Place the crate in the pen, with food and water near by. After arranging it so that the birds can come out when they get ready, leave them and keep away from the pen, except when necessary to feed and water, as pheasants are easily scared when changed to new quarters. After a few days they will become accustomed to their new home and can be cared for without trouble. The same person should attend to the birds all the time if possible, and should always wear the same clothing when among them, as they are sensitive to any change of appearance and become frightened very easily. Strangers always bother the birds, and dogs and cats should never be allowed near the runs. Handle the birds only when actually necessary, and then only by grasping them *over* the wings and around the body. Never grasp them by the wings or legs, as is commonly done with poultry.

FEED FOR ADULT BIRDS.

Those foods that contain the elements and properties of their natural food supply, and to which they have been accustomed through centuries of feeding in the wild state, are naturally best suited to the pheasant in captivity. Do not overfeed, as it is sure to induce disease. The pheasant is a small feeder, needing only about half as much food as the chicken.

Variety in food is very important, as the pheasant in his wild state eats practically every edible substance he finds. Adult birds require feeding morning and evening, no more food being given them than will be cleaned up. We have found the best food to be a mixture made after the following formula:

Broken wheat (not screenings)	20 pounds
Fine (granulated) cracked corn	15 pounds
Oat groats	15 pounds
Coarse beef scrap	10 pounds
Millet seed	10 pounds
Canary seed	10 pounds
Rape seed	5 pounds
Hemp seed	5 pounds
Fine chicken grit	5 pounds
Fine granulated charcoal	5 pounds
	100 pounds

We should say at this point that none of the various poultry foods that we have tested has proven suitable for pheasants. The birds must have plenty of green ground bone at all times and be given an abundance of green feed, such as cabbage, lettuce, swiss chard, fine cut lawn clippings, clover or alfalfa. They like lettuce best. Pheasants get unthrifty at once if deprived of the green stuff they need. Fresh water in abundance *must* always be handy. Scald all watering dishes *every* day, and keep drinking water in the shade or change it often; warm water favors the development of bacteria that cause disease.

MATING SEASON.

The mating season will, of course, vary with the locality, but, generally speaking, it begins in April and extends into August. In captivity the pheasant hen lays from forty to seventy-five eggs. Nests are useless, as the hens will seldom use them, but drop their eggs on the ground anywhere in the pen.

The eggs should be gathered as soon as laid, or at least twice a day; otherwise the birds (particularly the males) will eat them. A sure cure for the egg-eating habit is to blow some eggs and fill them with melted soap and place in the pens. Eggs should be set as soon as possible; after they are fourteen days old they are unfit for hatching.

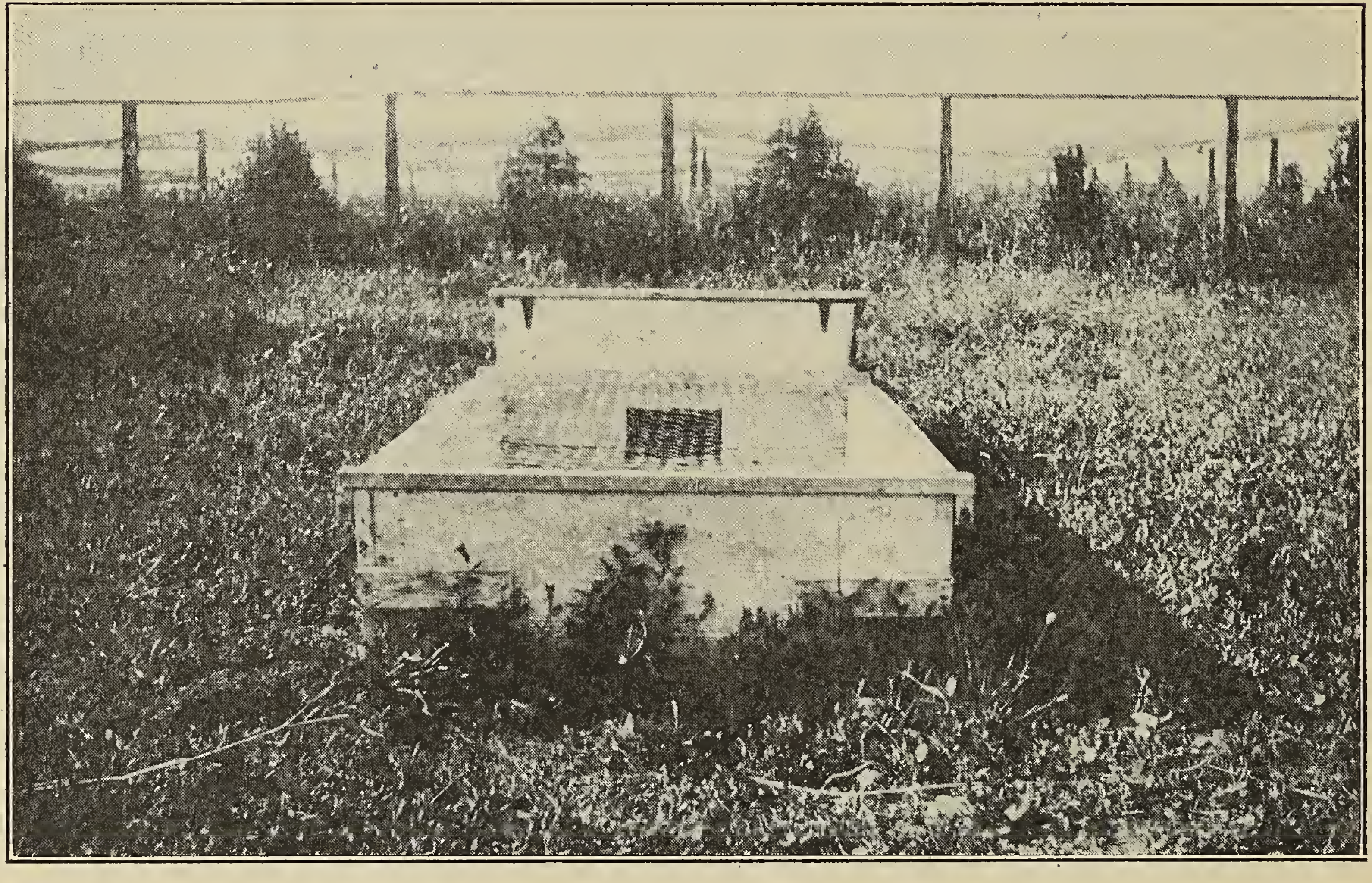
After hens have stopped laying for the season they can often be encouraged to resume by moving them and the male to a new, clean pen. The ''lay'' in the new pen sometimes exceeds that in the old one, and, of course, more than pays for the expense of extra pens.

HATCHING.

The pheasant hen in captivity is a poor mother; besides, it is more profitable to keep her laying. Wyandottes and Rhode Island reds make the best ''mothers'' for pheasant eggs and chicks, although any domestic hen will do, so long as she is a good ''setter.'' Turkey hens are splendid mothers, as they are very quiet on the nest and careful with young birds. They seldom step on the chicks and are not so given to roaming as hen chickens are. The eggs must be set so that they will receive the benefit of ground moisture in a nest made after this plan:

Dig a hole *in the ground* in a shady place and shape a nest in it with excelsior; a handful of onion skins is a valuable addition, as they help to keep lice away. The nest should be enclosed with a box without a top and about twelve inches high to prevent the young birds from escaping as soon as they hatch. Before placing the hen on the eggs be sure that she is free from lice and disease, as lice are certain death to young birds and are the cause of most failures in raising pheasants. One insect feeding on top of a chick's head will kill the bird if not destroyed or removed. Dust the setting hen with some good lice powder, at least three times during the hatching period (but not within three days of hatching), and if at any time the young birds show evidence of being infested with lice, such as drooping and refusing to eat, dust them with lice powder and grease under their necks and on top of their heads with lard or olive oil.

From fifteen to seventeen eggs make a good setting for a chicken hen, while a turkey hen will cover from twenty to twenty-five. The period of incubation varies from twenty-one to twenty-eight days, although well fertilized eggs usually hatch on the twenty-third day, and all about the same time. The hen should be undisturbed during the hatching time and the young birds left in the nest until the youngest is a day old, as they need the ''mother's'' warmth for drying and strength-giving.



A coop for the mother and her chicks should be ready as soon as they are taken from the hatching nest. A cut and description of a very satisfactory coop is given herewith.

This coop (as shown) is three feet wide by six feet long and is twelve inches high, except in the hen's compartment, which is raised to twenty inches at the inner end. A space two feet long should be partitioned off at one end for the hen and an eight-inch opening left. This opening should be covered with slats spaced so that the chicks have just enough room to pass from one compartment to the other. The hen's compartment should be made with a hinged cover, to facilitate feeding and handling, while the runway should be covered with one-inch mesh netting, set in a sliding frame. It is a good plan to set the coop on a freshly cut grass plot and move it daily. The tender shoots of new grass form a wholesome part of the chick's food, and they are very fond of it, besides which, there is daily provided a supply of insect life.

After the chicks are four days old and know the call of their foster mother, they may be allowed to leave the coop after the morning dew has disappeared, and forage for themselves. Many breeders even allow the hen and her brood their freedom until the young birds show a disposition to fly out of the enclosure, when they transfer them to covered pens. Young birds cared for in this manner will be hardier and freer from lice and disease than those confined in coops.

THE FEEDING OF PHEASANT CHICKS.

It is important that the hen and her brood be fed separately. The young birds should not be fed at all until they are twenty-four hours old, as they come from the shell sufficiently well nourished to maintain their strength for that length of time, but they should have clean sand or fine gravel to pick at from the first. By the second day they will begin to get hungry and need feeding every two hours. After they are five days old, let the feedings be gradually reduced, until, at the expiration of three weeks, the birds are being fed but three times a day.

As soon as the young birds are ready to eat, they should be fed on a milk curd made as follows: Heat one quart of sweet milk to the boiling point, stir in ten eggs (well beaten) and then cook until the curd is well done. Strain off the watery fluid and you have a crumbly food that contains nearly all the elements essential to young pheasant life. A mixture of milk, eggs, and oat or corn meal in proportions to make a dry crumbly mixture is also a fine food. Boiled potatoes, mashed and mixed with finely chopped hard boiled eggs, corn meal, and bran—with or without finely chopped scraps of meat—provides a food that the young birds like. Still another suitable food is a mash of corn grits, wheat middlings, bone meal, beef scraps, and milk, made rather dry. In making curd, make only enough to last one day, as it spoils quickly, and sour food is death to the birds.

Maggots are the very best animal food for young pheasants. They are easily procured, and the chicks may eat as many as they desire with perfect safety. But maggots should not be given to the birds until they have lain in bran long enough to clean themselves. Maggots when taken direct from meat seem to be poisonous and are a dangerous food. Maggots may be procured in various ways, but we will describe but two plans, both of which have been used by us. Take crushed green bone and finely chopped meat, and place out doors until the mixture is well covered with fly eggs. Then fill a box or pan half full of bran, over which spread thin scraps of liver or meat for food for the maggots, and spread the flyblown green bone and meat on top. Another good method is to hang a beef or sheep head until the maggots get big enough to drop out. Then place a box of bran underneath and allow the maggots to lay in the bran a day of so before giving them to the birds.

Lettuce is a splendid food for young birds, and they should have it all the time. Fasten a head to the ground with a sharp stick and the birds will pick it off as they want it. Leave no remnants of food around the pens to become stale, and keep everything as clean and dry as possible. Dampness causes colds and gapes. Have plenty of fine grit and sand in reach at all times, and it is well to keep a pan with such food as is fed to the adult birds in the coop so that the youngsters may learn to eat it.

For watering the young birds, it is best to use the fountain jars that can be bought of any poultry supply house. The quart size is the best. Their drinking water *must always be fresh* and the fountain jars (and food pans) should be cleaned and scalded every day.

Usually the birds can be moved to the large runs by the time they are two or three weeks old. *Don't* put them with old birds. By the time they are five weeks old they may be fed anything they would find in the wild state. Young birds (as well as old) must always have dust or ashes to ''dust'' themselves in. This is their way of taking a bath and freeing themselves from insects.

DISEASES OF PHEASANTS.

By George Byron Morse, M.D., V.S.

In charge of investigations of diseases of birds and cold-blooded animals, United States Bureau of Animal Industry.

DISEASES AFFECTING YOUNG PHEASANTS.

Pasting.—Pasting occurs usually during the first week of life. The chick loses its vivacity, sits with eyes closed and its downy coat fluffed until it appears like a ball. Examination reveals the vent plugged or covered by a whitish, chalky, or pasty substance. This stoppage of the vent frequently leads to death in a day or two as the result of the absorption of putrefactive poisons due to retention of the feces. Treatment consists in the immediate, gentle removal of this chalky plug and the application of a few drops of sweet oil or a bit of petrolatum.

Diarrhea.—Whitish diarrhea may be caused in very young chicks by cold, by overheating, by overfeeding, or by too little or too much water. The observant fancier will come to recognize these conditions almost instinctively, and will relieve them by at once altering the régime. This should be all that is necessary. If more is required it is evidence that either the case has been permitted to run so long that the chick is too weak to recuperate or infection is operating.

White diarrhea of chicks, so dreaded by the poultryman, is an affection of pheasant chicks as well. The diarrhea is merely a symptom of a severe infection of the intestines, especially of the blind pouches or ceca, by a low form of animal life, known as *Coccidium tenellum,* and we therefore speak of the disease as an intestinal coccidiosis. The white coloration of the fecal discharge, as in the two previous diseases, is due to excretions from the kidneys. In certain virulent forms of the disease the minute blood vessels on the inner portion of the intestinal wall burst, and the bleeding gives rise to a dark brown or even blackish coloration, which obscures the white effect of the uric acid.

Treatment should begin with the administration of Epsom salts, mixing them in a mash and estimating from eight to fifteen chicks to one teaspoonful of the salts, according to age, size, and previous thriftiness. The drinking water should contain sulphate of iron (copperas) in the proportion of ten grains of the copperas to one gallon of water or enough permanganate of potash may be added to the drinking water, to give the water a claret-red color. The coops, feeding utensils, drinking vessels, and runs should be disinfected. As a preventive measure, incubators and brooders should be cleansed and disinfected, and, prior to incubation, whether natural or artificial, the eggs should be dipped in ninety-five per cent alcohol or in a four per cent solution of some good coal-tar disinfectant.

DISEASES AFFECTING MAINLY ADULT PHEASANTS.

Roup.—Certain affections known as contagious catarrh, diphtheria, and roup, if, indeed, they be distinct diseases, generally group themselves in the fancier's mind under the one name, roup. The term diphtheria should not be used, because it belongs properly to that disease in the human family which is caused by a special bacillus which does not cause disease in birds. The other two names may represent two different stages of the same disease, a contagious inflammation of the mucous membranes of the eyes, nose, mouth, throat, gullet, or windpipe, which may express itself by a watery, sticky, bad-smelling secretion, or by the development of yellowish patches.

In the treatment of these affections the first thing is to recognize the contagiousness and to isolate the sick birds. Disinfect the houses and ground. Make a mixture of peroxide of hydrogen and boiled water, equal parts; into this plunge the head of the affected bird. By means of a slender wire covered with a little absorbent cotton and dipped in this mixture clean out of the eye or scrape off the tongue and sides of the mouth all yellowish matter, and apply a four per cent solution of borax or boracic acid or the peroxide solution named above. Give all birds, sick and well, a dose of Epsom salts. Keep iron sulphate or permanganate of potash in the drinking water.

Enteritis.—Enteritis, as used in bird medicine, means inflammation of the intestines. While it may originate from cold, improper feeding, and the like, it is usually an infectious disease and calls for prompt cleansing of the digestive tract, which is best accomplished by Epsom salts or a teaspoonful of castor oil containing about fifteen drops of turpentine. Add iron sulphate or permanganate of potash to the water; isolate the affected birds. Disinfect thoroughly the houses, utensils, and grounds, and sprinkle lime everywhere. The causes may be coccidia, such as we find in white diarrhea of chicks; flagellates, as in the canker of pigeons; or bacteria, as in Klein's infectious enteritis.

Cholera.—Cholera would really come under the third class just mentioned. The organism causing it is frequently so virulent that death comes within a few hours, even before the diarrhea symptoms have had time to manifest themeslves. The treatment would be practically that outlined under enteritis, although treatment is usually of no avail. Kill the very sick and treat only the apparently healthy, thus anticipating and preventing the disease. Necessary in all the other diseases, it is of supreme importance in cholera to burn quickly all dead birds, after saturating them with coal oil. Burying deep and covering with lime may have to do, but it is not so good a method. In killing the sick birds do not use the ax, and thus spatter everything with the infective blood.

Scurfy legs.—The affection known as scurfy legs, scaly legs, scabies, or mange of the legs and feet is caused by a parasitic mite, *Sarcoptes mutans,* which burrows under the scales and by its presence sets up an irritation which causes a rapid increase in production of cells, together with a secretion resulting in a gradual thickening and elevation of the scales. Being a parasitic disease, scaly legs is transmissible from one bird to another and from infested houses, perches, nests, etc. Treatment must begin with isolation of the patient and the thorough application to the coops and fixtures of boiling soapy water, then kerosene, and finally a coat of five per cent carbolic acid, to which has been added enough lime to make a whitewash. The affected bird should have its legs soaked in warm soapsuds, this part of the treatment being completed by a good scrubbing with a small hand scrub. This alone has cured the disease. However, it is best to follow this with a good rubbing of sulphur ointment (one part flowers of sulphur to nine parts of lard, sweet oil, or vaseline).

GENERAL REMARKS.

Pheasants can be hatched in incubators and raised in brooders, but unless one has had much experience along those lines, it is best to resort to the domestic hen.

There are numerous other methods of raising pheasants, but from the success had with this one we recommend it as particularly satisfactory.

The best plan is to always follow nature as closely as possible and *beware of filth and lice.* For any information that you may desire which is not contained in this booklet, write to the ''Superintendent of the State Game Farm, Hayward, Cal.,'' and he will give you such suggestions as you may need to make a success of raising pheasants. Any one going into the business extensively should have special instructions and must provide a different equipment.

IMPORTANT.

HOW TO LIBERATE GAME BIRDS.

If game birds are taken from the crates and left to fly, in their fright and desire to get away as far as possible from the crate, they will continue until exhausted. Such a flight will land them outside the lands they are intended for and will scatter them so badly that the pairs may never be reunited. If this is not the case, the exhausted birds will fall easy prey to predatory birds and animals.

To prevent this it is best to take the crate to some suitable location—in or near thick brush and with water at hand—and scatter plenty of feed about. Now quietly open the doors and go away from the crate, allowing the birds to leave in their own way—undisturbed by any one. If liberated in this manner, the game almost invariably will make its home close to the spot where it found its first food.

Birds should be liberated during the daytime so that they may get together, if scattered, and select a safe roosting place before night comes on. Where it is possible to do so, splendid results will be obtained by opening the crates in some old barn or ranch building and keeping the birds penned up for several days before allowing them their full liberty.

If the birds are fed and watered and left to themselves, they will recover from the effects of close confinement and traveling, and be in such condition that predatory hawks and ''varmints'' will do them no harm. When ready to liberate them, open a door and allow the birds to come out in their own way and time.

Game birds should not be liberated where their natural enemies are numerous. By trapping, poisoning, and other means, endeavor to kill off all predatory animals and such birds of prey as the great horned owl, sharp-shinned hawk, Cooper's hawk, duck hawk, butcher bird, and blue jay, before turning out any birds.

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